74

UNITED STATES DEPARTMENT OF THE INTERIOR
STEWART L. UDALL, SECRETARY
Fish and Wildlife Service, Clarence F. Pautzke, Commissioner
Bureau of Commercial Fisheries, H. E. Crowther, Acting Director

---

Foreign Fisheries Leaflet 74 1/

Washington, D. C. February 1967

LIBRARY
APR 12 1967
FISH & WILDLIFE SERVICE

THE SHRIMP INDUSTRY OF CENTRAL AMERICA, THE CARIBBEAN SEA, AND NORTHERN SOUTH AMERICA 2/

by

Richard S. Croker

Regional Fisheries Officer
United States Embassy
Mexico, D. F.

Issued by Branch of Foreign Fisheries, Division of International Affairs, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service.
1/ Formerly "Market News Leaflet" series.
2/ Information supplied by United States Embassy, Mexico, D.F.
(This report has been reproduced directly from the best available copy.)

TABLE OF CONTENTS

		PAGE
Preface		2
I.	Introduction	3
II.	The Shrimp Fishery of the Pacific Coast of Central and South America	7
	A. General	7
	B. Guatemala	9
	C. El Salvador	13
	D. Honduras	22
	E. Nicaragua	23
	F. Costa Rica	27
	G. Panamá	33
	H. Colombia	43
	I. Ecuador	52
	J. Perú	58

PAGE

III. The Shrimp Fishery of the Caribbean Sea ---------- 62

A. General ---------- 62

B. Honduras ---------- 63

C. Nicaragua ---------- 69

D. Venezuela ---------- 74

E. Other Countries ---------- 91

IV. The Shrimp Fishery of the Atlantic Coast of Northeastern South America ---------- 96

A. General ---------- 96

B. Barbados ---------- 101

C. Trinidad and Tobago ---------- 104

D. Guyana ---------- 106

E. Surinam ---------- 109

F. French Guiana ---------- 113

G. Brazil ---------- 118

V. Acknowledgments and References ---------- 121

PREFACE

1. This report describes the rapidly expanding fishery that has arisen in the tropical waters of Central and South America to supply the United States market demand for frozen shrimp. From a small beginning in 1950, the industry in the area has grown to the point where it supplies the United States with over $35 million worth of shrimp annually.

2. The tropical shrimp fishery of the Western Hemisphere can be divided naturally into six areas, which have a minimum of overlap: (1) the South

Atlantic Coast of the United States; (2) the Gulf of Mexico (United States and Mexico); (3) the Pacific Coast of Mexico; (4) the Pacific Coast from Guatemala to Ecuador, inclusive; (5) the Caribbean Sea; and (6) the Atlantic Coast of Northeastern South America. The present report describes the fisheries of the last three named areas.

3. This report is a sequel to a report prepared in 1956 by the reporting officer's predecessor at a time when the fisheries south of Mexico were just beginning to develop ("Survey of Shrimp Fisheries of Central and South America," by Milton J. Lindner). In that report the potentialities of the area were outlined on the basis of the author's knowledge of the shrimp resources and his personal investigations. The present report describes what has happened since then throughout the area. Like the earlier report, it is based on personal surveys which took the reporting officer to almost every major shrimp port in Central America, the Caribbean and northern South America.

4. Throughout this report, weights are given in pounds, and prices and values are expressed in U.S. dollars. Although most of the countries in the area use the metric system of weights and have different currencies, the industry is tied so closely to U.S. practices that even the fishermen and plant workers talk in terms of pounds and dollars.

5. Because fishery statistical systems vary from country to country, and because the great majority of the shrimp are destined for the United States market where they pass through U.S. Customs, the best comparative statistics are those of the United States. Hence, throughout the report, the official United States import figures are used unless noted otherwise. The source for import quantity and value figures is: "Imports of Shrimp, by Continent and Country of Origin, 1951-1964," compiled by the Branch of Fishery Statistics, Division of Economics, U.S. Bureau of Commercial Fisheries. Figures for 1965 and 1966 imports are from press releases of the Fishery Market News Service of the same bureau.

I. INTRODUCTION

1. Of all the fishery products consumed in the United States today, fresh and frozen shrimp is by far the most important.

2. The demand for this high priced delicacy has increased in a spectacular manner during the last twenty five years, to more than keep pace with the growing purchasing power of the United States consumer. The consumption of shrimp in 1965 was 2.3 times as great as it was in 1950. The United States consumer bought 299 million pounds of shrimp in 1964, for a per capita consumption of 1.56 pounds (heads off weight). The rapid increase continued in 1965 (8 per cent over 1964) to 323 million

pounds, or 1.67 pounds per capita.

3. To satisfy the appetite for shrimp, the domestic industry of the Gulf Coast and South Atlantic states has doubled and redoubled. The emphasis changed from canning to fresh and frozen, as consumer tastes changed, and now the industry produces a great variety of packaged shrimp: headed with shell on; peeled and deveined; butterfly (peeled and split open with tail attached); breaded; cooked and breaded. These come in packages of many sizes, for institutional and home use, and the shrimp themselves come in every size from jumbo down to tiny, but always carefully graded and differentially priced.

4. Expand as it would, and even though its fleets fished in the distant waters off México's Gulf Coast and in the Caribbean, as well as in home waters, the domestic industry could not completely supply the new market which it had created. Soon, American operators set up bases in foreign ports and began to ship shrimp to the United States. Quickly, the residents of these countries realized that they could get into the business and they too built up fleets and freezing plants, sometimes with U. S. financial support and sometimes without.

5. The first country to participate was México, with large scale operations commencing on the Pacific Coast in 1941 and on the Gulf Coast in 1945. Imports from México grew at a tremendous rate and the domestic producers soon came to fear the competition. After much bickering and many attempts to impose tariffs or quotas, the U. S. industry finally joined the Mexican producers in the Shrimp Association of the Americas. The new group initiated a promotional campaign and in many ways brought together the producers, packers and distributors of the two countries.

6. Meanwhile exploration of new grounds in all the likely warm seas of the world took place, and new industries grew up to take advantage of the bonanza. The first successful fishery was on the Pacific Coast of Panamá, commencing in 1950. Other early entrants were Colombia and Perú in 1953, Ecuador in 1954, Costa Rica in 1955, and Cuba in 1956. Of the early participants, only Panamá and Ecuador have become big suppliers, and Colombia and Costa Rica have developed moderate industries.

7. Somewhat later, other countries entered the field, some on a very large scale. By 1964, imports were supplying about half of the U.S. market. In that year, imports of all fresh and frozen shrimp products amounted to 154 million pounds with a value of $107 million. This record was topped in 1965 with imports of 163 million pounds. This is a dramatic increase from 5 million pounds in 1940 and 40 million pounds in 1950.

8. Suppliers of shrimp to the United States in 1964 included 14 countries in North and Central America and the West Indies, 9 in South America, 11 in Europe, 16 in Asia, 2 in Oceania, and 4 in Africa, for a total of 56 countries. During 1965 and the early part of 1966, nine more countries joined the list. Of these 65 suppliers, many export shrimp to the U.S. on a small scale or as incidental to

other aspects of their fishing industry, although all eye the lucrative American market with genuine interest. In about twenty countries the shrimp industry has developed almost entirely to supply the U. S. market.

9. The purpose of the present report is to describe the shrimp fisheries in three areas which for a variety of reasons are of particular interest to the U. S. shrimp industry: the Pacific Coast of Central America and northern South America, the Caribbean Sea, and the coast of the three Guianas and northern Brazil. These three areas provided the U. S. with 33 per cent of its shrimp imports in 1964, contributing shipments valued at over $35 million. This compared with 50 per cent for Mexico and 17 per cent for all other areas.

10. The relatively old, stable and almost fully developed fisheries of the Pacific Coast of Central America, Panama, Colombia and Ecuador provided the U. S. with 31,134,000 pounds of shrimp, valued at $21,005,000, in 1964. 1/

11. Fisheries in the Caribbean Sea supplied the U. S. with 10,328,000 pounds of shrimp, valued at $6,179,000, in 1964. 2/ By and large, shrimping in the Caribbean is desultory except in the waters off Honduras, Nicaragua and Venezuela. The recent growth of the fishery in Venezuela can only be described as sensational.

12. The fishery off the coast of the three Guianas and northern Brazil is the latest to be developed. The fleets fishing in this area, and which are based in Barbados, Guyana (British Guiana), Surinam and French Guiana, supplied the U. S. with 11,258,000 pounds of shrimp, valued at $8,339,000, in 1964.

13. With the exception of the fishery in Venezuela, all of the shrimp fisheries in the three areas were developed strictly for the United States market. Since their development, most of them have achieved moderate success in marketing a small but growing part of their catches locally. In addition, one fleet in Surinam fishes solely for the Japanese market, and French Guiana ships some shrimp to France. The shrimp industry in Venezuela is an outgrowth on a very large scale of a sizeable fishery that has supplied the domestic market for a long time.

1/ Nicaragua has fisheries on both the Pacific and Caribbean coasts; imports are not differentiated in U. S. Customs reports, but have been separated herein on the basis of information supplied by the Nicaraguan Government.

2/ Exclusive of catches made in the Western Caribbean by vessels based in the U. S. and Mexico.

14. To a greater or lesser degree, United States fishermen, vessels, plant operators, importers, and investors have been involved in nearly all of the shrimp fisheries of the three areas. There has also been French, Japanese, Portuguese and Mexican participation. To a considerable extent foreign involvement has been replaced by local personnel and investment. The fishery on the Pacific Coast commenced at Panamá and spread both north and south, whereas the Caribbean and Guiana fisheries are outgrowths of U. S. fishing in the Gulf of Mexico.

15. The fisheries of the three areas are based on numerous species of large sized, warm water shrimps (sometimes called prawns) of the genus Penaeus. These are of three general types, distinguished by their color: white, brown and pink. On the Pacific side are three species of white and one each of brown and pink. On the Atlantic side, two species of white, two brown and one pink dominate the catches. Although priced somewhat differently and attaining varying maximum sizes, all are readily acceptable to the U. S. consumer.

16. In many areas, several smaller species of shrimp, known to the trade as sea bobs, are extremely abundant. They are taken in growing amounts as new markets for them are being developed. Although the large sized penaeid shrimps now dominate the fishery, the sea bobs form a tremendous resource in reserve for future exploitation.

17. All of the white, brown and pink shrimps have similar life histories, and their occurrence in significant quantities depends on their strict habitat requirements. They spend their adult lives over muddy sea bottoms in depths of one to fifty fathoms, depending on species. They spawn at sea. The very young shrimp move into coastal lagoons or estuaries where they spend varying periods of time in brackish water. As sub-adults they move from the lagoons to nearby ocean waters, where they finish out their life span of a little over a year. Hence, fishing areas are confined to open waters over a mud bottom, which are adjacent to large brackish lagoons, and to the lagoons themselves. A classic example is the tremendous nursery area of Lake Maracaibo, Venezuela, where the sub-adult shrimp are harvested in the lake by beach seines and cast nets, and the large shrimp are taken by trawling in the adjacent open waters of the Gulf of Venezuela. In no cases have substantial shrimp fisheries been developed over rocky or clean sand bottoms, nor distant from brackish water lagoons.

18. On the Pacific coast, the large penaeid shrimps are found in a relatively continuous band all along the coast from northern México to northern Perú, with only a few gaps along stretches of rocky and sandy shores. On the Atlantic side they are found from the southern coast of the U. S. to Brazil, including the Gulf of Mexico and the Caribbean Sea. However, they do not occur in substantial quantities around the shores of the Greater and Lesser Antilles, and there seem to be long gaps in their ocurrence in apparently favorable areas along the mainland coast of the Caribbean.

II. THE SHRIMP FISHERY OF THE PACIFIC COAST OF CENTRAL AND SOUTH AMERICA

A. GENERAL

1. Although the shrimp fishery in the Pacific started in northern México as early as 1941, it was not until 1950 that any large scale fishing commenced in any other area. In that year, the fishery of Panamá got underway, and within a few months had become an important industry.

2. From Panamá, the fishery spread south to Colombia and Ecuador, particularly the latter, as American operators expanded their operations. In fact, the Panamanian industry over-expanded so rapidly that many producers left for less crowded waters. Development northward was somewhat slower, although small scale operations commenced in Costa Rica as early as 1952 and reached respectable proportions by 1958, the same year that the fishery in El Salvador sprang into prominence. Guatemala and Nicaragua followed.

3. Meanwhile, the Mexican fishery in the Gulf of Tehuantepec developed in the early 1950's and reached its peak in 1959.

4. As of 1966, the shrimp fishery of the entire Pacific Coast, from México to Ecuador, has been developed to its maximum capacity, with the following possible exceptions:

   a. Fishing in deeper water, principally for pink shrimp, could increase production in many areas;

   b. Greater utilization of the smaller species of shrimp (as in Panamá) could increase landings in Central America;

   c. Development of suitable small craft harbors would result in the expansion of the fishery in Guatemala;

   d. Use of larger boats and additional ports would result in an increase in Costa Rican production;

   e. Catches in Colombia could be increased if more vessels were permitted to enter the fishery.

5. Otherwise, exploitation of shrimp stocks appears to be very nearly complete, and future fluctuations in catches will be due to changes in the natural abundance and availability of shrimp, or to changing market conditions.

6. Shrimp are found in commercial quantities along most of the Pacific Coast of Central America. The Guatemala grounds are actually an extension of the Mexican grounds in the Gulf of Tehuantepec. In fact, several incidents have occurred involving the trawlers of both countries fishing off the coast of the other as fishing success varies north or south of the border. In turn, the Guatemala grounds merge into those off El Salvador, which are probably the most productive of any along the Central American coast. Surprisingly, the Gulf of Fonseca produces little shrimp. Accordingly, Honduras, which faces the Pacific only on part of the gulf, has nothing more than a small scale fishery. The Nicaraguan coast, lacking suitable lagoons and offshore habitat, contributes only in a minor way to the total production. Costa Rican fishing grounds are mostly in or near the Gulf of Nicoya, but relatively unexploited grounds exist in the Gulf of Dulce.

7. The extremely productive fishery of Panamá is located in the Gulf of Chiriquí and the Gulf of Panamá. Shrimping is conducted along most of the Colombian coast, particularly near Buenaventura. Ecuador's most important shrimp grounds are near Esmeraldas and in the Gulf of Guayaquil.

8. Along the Pacific Coast, the large white shrimp is dominant. Actually the so-called white shrimp consists of three species: Penaeus stylirostris (sometimes also called blue shrimp), P. vannamei, and P. occidentalis (the most important species in Panamá, Colombia and Ecuador). The latter two are sometimes dark in color and are then called brown shrimp, along with P. californiensis, the true brown. The pink shrimp, P. brevirostris, is of considerable importance in El Salvador and Panamá. This deeper water species is fished during periodic scarcities of the whites which are larger and command a higher price.

9. In addition to the big peneid shrimps, which are the mainstay of the export shrimp fishery, significant quantities of four species of smaller shrimps contribute to the catches, particularly in El Salvador, Panamá, Ecuador and Costa Rica. These are: Xiphopeneus riveti and Protrachypene precipua, which are known as sea bob or titi; and Trachypeneus byrdi and T. faoe, which are variously called tigre, indio, zebra (or cebra), pomada, and carabalí. In some areas, all the small shrimps are collectively called chacalín; elsewhere they are known as camaroncillo.

B. GUATEMALA 1/

1. Guatemala has a coastline on the Pacific of approximately 155 miles. The two ports, Champerico and San José, are open, unprotected roadsteads with piers but no harbors. Champerico is about 25 miles from the Mexican border. San José is about 80 miles to the southeast, some 50 miles from the border with El Salvador. Both towns are shrimp ports.

2. Shrimp are fished along the entire coast, except for a few rocky spots. The fleet based in Guatemala ranges all the way from the Mexican border to El Salvador. Judging from frequent allegations, Guatemalan vessels sometimes fish beyond the frontiers, and likewise vessels from the neighboring countries stray at times into Guatemalan waters.

3. The fishery commenced on a major scale in mid 1960, although some shrimp had been exported previously (most of the early shipments were from a small scale fishery on the Caribbean Coast that has since terminated).

4. In 1960, the fleet consisted of three trawlers at Champerico and six at San José. By early 1962 there were 14 boats at Champerico and nine at San José. At this time, the Government set a maximum limit of 50 vessels for the Pacific Coast. This limit is still in effect. Some operators feel that the resource is not large enough to support 50 boats and would prefer to see the number cut. The maximum number actually operating was reached in late 1962 when 49 were registered. The fleet shrank to 25 in 1963, and to 20 in 1964 and 1965.

5. Commencing in 1960, the Champerico fleet landed its catches at the open-ocean pier, for freezing in the local plant. However, initially, the fleet based at San José landed its catches in Salina Cruz, Mexico, for freezing and shipping. This fleet consisted of Mexican boats operating under contract to a Guatemalan citizen, with special permission. Shortly thereafter a law was enacted that required the landing and freezing in Guatemala of all shrimp taken in Guatemalan waters. Consequently, another freezing plant was built in San José.

6. The extent of the Guatemalan shrimp fishery is indicated by the official United States import figures, in as much as the fishery exists primarily to supply the U. S. market. Some shrimp are exported to Japan and Canada, but no statistics are available. From 1958 to about 1963, a small portion of the shipments shown in the

---

1/ The survey of the fishery in Guatemala was completed in January 1966. This date is implied in all references to current operations, unless otherwise noted. The small shrimp fishery of Guatemala's Caribbean Coast is mentioned in Section III-E.

following table originated on the Caribbean Coast, but no breakdown is available.

IMPORTS OF SHRIMP FROM GUATEMALA (BOTH COASTS) TO THE UNITED STATES

(in 1,000 pounds)

1958	39	1962	2,298
1959	182	1963	1,943
1960	257	1964	2,207
1961	743	1965	1,516

7. During the first four months of 1966, exports to the United States lagged slightly behind those of the comparable period in 1965. By the end of May, the deficit was overcome and excellent production in July resulted in very large shipments. For the period January-July 1966, exports of shrimp to the U. S. were 1,228,000 pounds, compared to 933,000 in the comparable period of the preceding year. In fact, they were nearly as great as total exports for the entire year of 1965.

8. Most of the shipments shown above were heads-off, shells-on weight, but an increasing proportion is shipped as peeled and de-veined. For example, in 1964, peeled shrimp accounted for 256,000 pounds of the imports to the United States. This represented $155,000 of the total value of $1,135,000. The proportion has probably increased since then. Statistics of the Ministry of Acriculture indicated that the following amounts of shrimp were landed on the Pacific Coast (with the number of boat-days of fishing each year):

	1,000 pounds	Days Fishing
1962	2,079	6,000
1963	1,877	5,000
1964	2,900	5,000

It is entiraly possible that exports from the Caribbean Coast account for the small differences between total exports and Pacific Coast landings in 1962 and 1963. The excess of landings over exports to the U.S. in 1964 may represent exports to other countries, plus small but growing domestic sales.

9. The operation at Champerico is a joint venture of two companies, each of which owns ten boats. Pesca, S. A., and Copesgua, S. A., operate the freezing plant

at Champerico and share a headquarters office in Guatemala City. The ownership of both companies is 51 per cent Guatemalan interests and 49 per cent by the big Japanese concerns of Mitsubishi and Nichiro. Sharing management with Guatemalans are two Japanese in Guatemala City and several in Champerico, all of whom have their families with them.

10. The fleet is entirely under the Guatemalan flag. All vessels were built in St. Augustine, Florida, and are less than four years old. Following the usual trend throughout the shrimp world, the entire fleet is standardized to facilitate repairs and replacement of parts. The wooden vessels, 62 to 72 feet in length, all are powered with the usual Caterpillar engines. The captains and engineers are all Japanese. They do not have their families with them, but are sent on home leave in rotation. They are training local fishermen to take over, but as the Guatemalan manager said, "Guatemalans do not taketo a life on the ocean and we have to pay them high wages."

11. There are no port or repair facilities in Champerico. Consequently the vessels must go to Salina Cruz in Mexico for shipyard overhauls. In case of a major breakdown, a second boat has to accompany or tow the disabled one. As Salina Cruz is about 250 miles distant, this is a costly and time consuming operation and underlies the necessity for having a modern and standardized fleet. Additionally, during stormy weather, the vessels must put to sea to avoid being dashed on the beach. During moderately high seas, the vessels can not discharge their catches. Hence, operating costs are higher in the Guatemalan fishery than elsewhere.

12. Fishing trips are generally of 12 or 13 days' duration. The boats occasionally fish out to a depth of 55 fathoms, but mostly stay inside 35 fathoms. The catches are principally whites (blancos) and pinks (rojos). The whites are Penaeus stylirostris and P. vannamei. The whites and pinks are both seasonal, and alternate in predominating in the catches. Because of the high cost of operations, the lower priced sea bobs are fished only occasionally when the large shrimps are scarce. In Guatemala the sea bobs are called "chacolín." Shrimps taken in the lagoons for local consumption are called "camaroncillos".

13. The freezer in Champerico has a peeling and deveining machine for use on the smaller sized shrimps, and is increasing the proportion of the popular individually quick frozen peeled and deveined shrimp.

14. Exports destined for the eastern United States are shipped by refrigerated truck-and-trailer to the new port at Puerto Matías de Gálvez on Guatemala's Caribbean Coast, and thence direct to Miami on the trailer ferry. Shipments for the U. S. and Canadian Pacific Coast and Japan go directly from Champerico by steamer. The distributor in the Miami area is International Fisheries Trading Co.

Mitsubishi International, Inc. handles distribution on the Pacific Coast and in Japan. Puerto Rico is a growing market for Guatemalan shrimp, with Cerra Comercial the distributor.

15. A couple of years after its start in 1960, the operation at San José languished. First the Mexican vessels left, and in 1962 the six Panamanian boats returned to their home port. As of early 1966, operations were scheduled to resume. The Government has issued the original permitee a new license. The company, headed by a Panamanian, will use the original freezing plant. The 30 vessels are all new: 10 were built in México, the remainder in the United States. The addition of this fleet to the 20 boats at Champerico will bring the total number of vessels up to the full number allowed.

16. As at Champerico, there is no harbor at San José, nor are there any repair facilities. Operations face the same handicaps; in fact the distance from the shipyards in Salina Cruz is greater.

17. Only enterprises that are partly owned by citizens of Guatemala may obtain licenses. With the fleet up to full strength, and with the resource being fished up to its maximum, and because there are no additional port facilities, it is not likely that any more licenses will be issued. At present there is no export tax on shrimp. As an incentive, licensees are given the first five years of operations tax free. For the following five years, half of their exports will be subject to taxes.

18. Shrimp license holders are required to take care of the local market for shrimp and fin fish before they can export. In as much as figures of the Food and Agriculture Organization show that Guatemala has the world's lowest per capita consumption of seafood, this is not a difficult condition to meet. Local sales of shrimp are almost entirely to the tourist hotels in the capital. Gradually, sales of fin fish in Guatemala City are increasing. The fish which are caught incidentally in the shrimp nets are shipped by truck directly to the cold storage plant in the city. Here they are sold to distributors, as the shrimp companies have no system of distribution. The operators at Champerico report a rapidly growing export market in the United States for high quality fish, particularly corbina and snappers. Government statistics report the following amounts of fin fish landed by the shrimp fleet at Champerico: 316,000 pounds in 1962, 315,000 pounds in 1963, and 509,000 in 1964.

19. Observers believe that the potential production of the Guatemalan fishery, taking into account the complete lack of port facilities, is somewhere between the record catch of 2,9000,000 pounds taken in 1964 and 4 million pounds (heads-off weight). Plans are under consideration for developing a good harbor,

but even if work were to start soon it would be a long time before the proposed port could be in operation. 1/ If and when a harbor is built, operations can be conducted much more efficiently, and as costs drop the catch can be increased. It will be possible to use the extensive sea bob resources economically. Also the boats will be able to fish farther offshore in deeper water for pink shrimp. Considering the difficulty of operating, it can be said that the Guatemalan shrimp industry is doing an excellent job.

C. EL SALVADOR 2/

1. The fishing grounds that lie off the 175-mile coastline of El Salvador produce more shrimp than any comparable area between México and Panamá. The otherwise undistinguished little tropical village of El Triunfo is one of the world's greatest shrimp ports.

2. The four fishing ports of El Salvador, in order from northwest to southeast, are Acajutla, La Libertad, Puerto El Triunfo, and La Unión. Of these, the first two support only small scale fresh-market fisheries, whereas the latter two are primarily shrimp ports. The shrimp trawling grounds extend along most of the ocean coast, with those in the eastern half being the most extensive. Very few shrimp are taken in the Gulf of Fonseca at the eastern edge of the country.

3. Although it had long been known that quantities of shrimp existed off the coast of El Salvador, no serious effort was made to exploit them until 1955. Previously, the only shrimp fishery was in the extensive lagoons and estuaries where canoe fishermen took juvenile shrimp with cast nets and traps. Their catch, destined for the domestic market, was estimated at 300,000 pounds, live weight, in 1955. The figure for 1956 was 700,000 pounds. Although the "inside" fishery still exists, it is said to have diminished, as the fishermen turn their attention to trawling in the ocean.

4. By the end of 1955 and early 1966, six trawlers were in operation. These were general purpose craft that captured shrimp along with fin fish. The fleet grew

---

1/ In 1963, the U. S. Army Corps of Engineers made a harbor feasibility study under the auspices of the U. S. Agency for International Development. The survey team found that a port was feasible at either Champerico or San José, but the latter would be preferable. It was determined that construction of a sheltered harbor would be a definite economic advantage to the shrimp industry. The report of the survey is listed among the references in Part V.

2/ The survey of the fishery in El Salvador was completed in January 1966. This date is implied in all references to current operations, unless otherwise noted.

gradually to a total of 18 in September 1959. Meanwhile, the vessels began to turn their attention solely to shrimp fishing. Following studies made by foreign experts, the Government set a limit of 18 as the maximum number of vessels that would be licensed to trawl for shrimp. As a result of further surveys that showed very large populations of shrimp, the limit was raised to 73 vessels in 1962. This is still the maximum number of shrimp trawlers which may be licensed.

5. The first export of shrimp to the United States commenced during the last months of 1957. The export industry grew rapidly. The industry was, and is, well organized, had Governmental support, used only good vessels and plant equipment, established high quality standards from the start, and has consequently thrived ever since its inception.

6. The magnitude of the fishery is indicated by the figures on exports, in as much as the industry was established primarily for exporting. Almost all of the shrimp that are exported go to the United States. The following table lists: U. S. imports, total exports from El Salvador by weight and value, and the revenue received from the export tax. The first two columns are from official U.S. import statistics; the others (which are provisional figures) are from various sources in the Government of El Salvador. The weights are heads-off, mostly with shell, but with increasing proportions of peeled and deveined shrimp. For example, in 1964, peeled shrimp accounted for 787,000 pounds of the total imports to the United States. This amounted to a value of $603,000. Undoubtedly the proportion has increased since then.

EXPORTS OF SHRIMP FROM EL SALVADOR

YEAR	IMPORTS TO U.S.A. WEIGHT 1,000 Pounds	IMPORTS TO U.S.A. VALUE 1,000 Dollars	TOTAL EXPORTS †† 1,000 Pounds	EXPORTS VALUE 1,000 Dollars	EXPORT TAXES 1,000 Dollars
1957	66	60	50	47	-
1958	1,130	660	1,131	660	-
1959	1,836	1,297	1,838	1,298	-
1960	6,697	4,214	6,750	4,255	-
1961	8,093	5,505	8,443	5,769	242 †††
1962	7,156	4,982	7,278	5,229	458
1963	6,667	4,279	6,842	4,668	410
1964	6,296	3,918	7,247	4,227	434
1965	5,377	†	†	†	†

† Figures not available

†† Available figures on exports to countries other than the U. S. (Japan, Guatemala and Honduras) are: 1957, 1958 and 1959, nothing; 1960 - 50,000 pounds; 1961 - 330,000 pounds; 1962: 122,000 pounds.

††† July to December.

7. The rapid rise of shrimp production, followed by a decline or levelling off, is typical in the newly developed fisheries. The decline in exports from Salvador, that set in following the record production of 1961, may have halted. Imports to the United States for the period January through July 1966 show a small but encouraging increase over the comparable period of the preceding year: 3,088,000 pounds, up from 2,609,000.

8. Needless to say, the four to five million dollars of foreign exchange earned by the shrimp industry is an important addition to the economy of El Salvador. In fact, shrimp ranks third in importance, behind only coffee and cotton, among all exports from El Salvador. The export tax of six cents per pound, which was first applied in July 1961, results in substantial revenue to the Government.

Accordingly, El Salvador has perhaps done more to manage its shrimp fishery wisely than any other country in the "shrimp world". Surveys and studies have been made since 1959 by an expert from the Food and Agriculture Organization, who for several years has been attached to the Fisheries Section of the Ministry of Economy. Government officials have received scholarships from F.A.O. to study abroad. And finally, El Salvador was one of the prime movers in organizing the Central American Fisheries Project of the United Nations Special Fund, headquarters of which were set up in San Salvador in early 1966. The system of limiting the size of the industry to what the resource will support has been quite successful (see Paragraph 24). It has been emulated and admired, but in few other countries are there sufficient scientific data upon which to base sound biological and economic management policies.

9. The shrimp industry is centered at Puerto El Triunfo, which is a small village on the shores of a very large lagoon that opens into the ocean about 125 miles southeast of the border with Guatemala, and 35 miles west of the entrance to the Gulf of Fonseca. The principal shrimp trawling areas lie within ten miles of the coast and extend about 40 miles to the west and 30 miles to the east from the entrance to the lagoon, which is known as Bahía de Jiquilisco and which is one of the principal nursery areas for young shrimp.

10. The two shrimp freezing plants in El Triunfo account for nearly all of El Salvador's production. The larger of the two is Pezca, S. A., which handles some 80 per cent of the national pack. It is one of the largest and best equipped plants in Latin America. It is located at the edge of a mangrove marsh and the boats unload at a pier which traverses the tide flats. Pick-up trucks transport the shrimps from dockside to plant in metal tubs. Pezca is constantly adding new equipment. In June 1965 it commenced operations with the most modern peeler-deveiner for producing individually quick frozen peeled and deveined shrimp, which are known to the trade as "I.Q.F." The machine is used for sea bobs and the smaller sizes of the white, brown and pink shrimp. Some of the larger sea bobs are prepared "butterfly" style, i.e., peeled and deveined, and split open, but with the tail left attached. Pezca is owned and operated jointly by Portuguese and Salvadoran interests, with some Panamanian capital.

11. The other plant at El Triunfo is equally modern and well equipped, although it lacks a peeler-deveiner and this operation is done by hand. This plant is known as Atarraya. It has a complicated three-way ownership and management, and any or all of three names are used on equipment, trucks and packages: Ataraya, S. A.; Congeladora Ballena, S.A.; and Consolidated Sea Foods of New York. Most of the capital is Salvadoran. This plant is making a special effort to develop a domestic market, particularly for frozen and packaged sea bobs, and reports very good success. The Ataraya plant is unique in that everything is painted in bright two-tone orange and blue: buildings, residences, shops, water tanks, equipment, trucks, even the workers' uniforms.

12. The only other shrimp plant in El Salvador is located at La Unión on the Gulf of Fonseca. Pesquera Centro Americana, S. A., is affiliated with another plant with a similar name in Puerto Somoza, Nicaragua, and at one time froze and packed shrimp for that concern, until the Nicaraguan company built its own freezer. Because La Unión is located on a shallow-water bay it was necessary to construct a long pier for the use of the trawlers. La Unión is rather far removed from the trawling grounds which lie to the west on the open coast. Surprisingly, there is little or no shrimp fishing in the Gulf of Fonseca. The company has had various financial and other difficulties, and from 1964 through 1966 its operating fleet has consisted of no more than four boats. Some of the boats that formerly fished out of La Unión have been fishing for Pezca. Accordingly, production has been limited for the last few years.

13. The ownership of the Salvadoran shrimp fleet is divided among some 15 fishing companies. Under the terms of the law, only vessels of Salvadoran ownership and registry may obtain permits to fish for shrimp within the 200-mile fishery zone claimed by El Salvador. The number of boats per company varies from one to twelve (which is the legal limit for any one company), with the two largest packing companies owning the largest fleets. The other fishing companies are owned by corporations or individuals, many of whom are associated with the packing plants. As noted above, the total number of vessels is limited to 73. Some of the licensed boats are inactive for one reason or another, hence at any one time the number of boats in actual operation averages between 64 and 67 (1961-1965).

14. In actual practice, the vessels fishing for the plants at El Triunfo operate as two fleets, one for each plant, even though a great many owners are involved. Sixteen vessels fish for Atarraya and somewhat over 40 deliver to Pezca. All the boats are equipped with brine tanks. Most of the boats were built in St. Augustine, Florida, with the others coming from México and Panamá. Most of them have standardized equipment and engines (Caterpillars) to facilitate service and replacement of parts. The original fleet was a miscellany of second hand craft of all sizes. Beginning in August 1959, the old boats were replaced by the new standardized vessels, mostly 62-footers. Also in August 1959, the fleet changed over from single net fishing to the present-day double nets. The Pezca vessels have Portuguese, Panamanian and Salvadoran captains, whereas most of the Atarraya fleet is served by Salvadoran skippers. In all, about half of the captains are Portuguese. All crew members are Salvadorans.

15. Pezca and Atarraya jointly built and operate a boatyard with marine ways, shops, and a parts depot, which is located across the bay from El Triunfo. The vessels of both fleets undergo regularly scheduled overhauls. In order to get the most out of their vessels, both fleets maintain extra crews and rotate their men on precise schedules. Each crew makes four consecutive trips (the average per vessel is two trips per month), and then takes liberty for one trip. As some

vessels are always at the boatyard, and with a rigid schedule for the crews, maximum use can be made of both boats and men. Perhaps nowhere else is there such an efficient, low cost fleet operation. During 1965, the entire fleet averaged 310 days per boat at sea. With the fishing grounds so close at hand, this meant an average of an incredible 290 days of actual fishing for each vessel.

16. This fishing efficiency is a necessity. The large fleet is apparently harvesting to the limit those shrimp resources which are available to it under present conditions. As fishing effort has increased, catches per unit of effort expended have dropped. The catch of the predominant white shrimp has been maintained only by fishing harder, as evidenced by the total number of vessel-days spent fishing in successive years: 1960 -- 12,000; 1961 -- 15,000; 1962 -- 16,000; 1963 -- 18,000; and 1964--19,000.

17. The fishery was developed originally to take advantage of the abundant white shrimp, which are predominantly of a very large size. Commencing in 1960, the industry started taking pink and brown shrimp, as well as sea bobs. The emphasis is still on the high priced white shrimp. The somewhat smaller pinks fetch a lower price and the little sea bobs fetch much less. The export tax of six cents per pound applies to all species and sizes, and other costs of handling are somewhat higher for the small shrimps. Hence, the inclination is to take only the largest shrimps. Except when the large whites are very scarce, the sea bobs, which are taken incidentally, are discarded at sea. With currently higher prices for peeled and deveined sea bobs, and a growing domestic market, a greater proportion of sea bobs is now utilized.

18. The white shrimp are seasonal in their abundance in the areas now fished by the fleet: out to a depth of 25 fathoms, occasionally to 35, and within 10 or 12 miles of shore. In general, the fleet concentrates on white shrimp during the period from October through April, and more or less avoids the pinks during that time. The catch per day for whites is highest from October to March, and the best months are November through February. However, the largest sized whites are taken during the period April to July when the catches of that species are at their lowest level.

19. The brown shrimps do not seem to be anywhere near as abundant as the whites. They are nearly as large in size as the whites, and comparable sizes bring prices only slightly lower. There is no specific fishery for browns, and they are taken principally on trips made for whites.

20. During the period when the white shrimp are scarce, particularly from May through September, many of the boats fish for pinks specifically. Others continue fishing whites, for even though they are scarce, the largest sizes, which bring the highest prices, predominate. The pinks seem actually to be most abundant during the same months when the fleet is concentrating on whites, and the few trips made for pinks result in high catches. The total landings of pinks

reflect fishing intensity, which is a result of the demand for that species, rather than abundance. It is generally felt that the catch of pinks could be increased greatly. Certainly, a large resource must exist out beyond the 35-fathom depth, which in most other areas is where the pinks occur.

21. All of the large white, pink and brown shrimp go by the general name of "camarón." The juveniles of all species, when caught in the lagoon fishery, are called "chacolín". The white shrimp, known in the industry as "blancos", consist of three species. Although the proportions of the three vary greatly from time to time, the average percentages are: Penaeus vannamei, 46; P. stylirostris, 31; and P. occidentalis, 23. The pink shrimp, known in El Salvador as "rojos" consist almost entirely of P. brevirostris. All of the brown shrimp, which are called "cafés", are P. occidentalis.

22. The sea bobs taken in the fishery of El Salvador consist of four species, all grouped together by the industry under the name of "camaroncillo." Two of the species, Trachypenaeus byrdi and T. faoe are indiscriminately called "tigre", "carabalí", or "cebra". The two smaller species, which are often discarded at sea, are the "titi", Xiphopenaeus riveti, and the "pomada", Protrachypene precipua.

23. According to figures of the Fisheries Section, Ministry of Economy, which are based on careful sampling at the plants, the catches of the various species by the trawl fleet in recent years were as follows:

EL SALVADOR SHRIMP CATCHES

(in 1,000 pounds, heads-off weight)

YEAR	WHITE	PINK	BROWN	SUB-TOTAL LARGE SHRIMP	SEA BOB	TOTAL, ALL SPECIES
1958	1,179	0	0	1,179	116	1,295
1959	1,846	11	1	1,858	64	1,922
1960	4,458	2,243	433	7,134	663	7,797
1961	3,856	1,652	960	6,468	2,037	8,505
1962	3,485	1,212	254	4,951	3,310	8,261
1963	3,632	1,054	205	4,891	2,820	7,711
1964	3,851	831	228	4,910	2,715	7,625

24. It is generally felt that the fishery is harvesting the white and brown shrimp resources very nearly to the limit. Further exploration and study of seasonal

movements might lead to somewhat greater production, particularly of browns. As in all heavily exploited fisheries, the catch per unit of effort has dropped, and more effort must be expended to maintain the total catch levels of these two species. Likewise, the average sizes of both varieties have diminished somewhat, another indication of intensive fishing. The percentage of whites in the "under 15 to the pound" category dropped from 83 per cent in 1960 and 85 per cent in 1961, to 71 per cent in 1962. The proportion of browns was 63 per cent in 1960, 81 per cent in 1961, and only 55 per cent in 1962. Anywhere else these proportions would be considered far more than satisfactory, and throughout the world industry El Salvador is still noted for its extra large shrimps.

25. Any real expansion of the industry will result only from greater utilization of the pink shrimp and sea bob resources. Both of these are becoming more attractive to the producers as the demand for the smaller sizes grows. With current high prices, and with the economies made possible by the use of peeling -- deveining machines, there is bound to be an expansion in the production of these varieties.

26. As noted above, the domestic market for shrimp, particularly for sea bob, is growing rapidly. The only year for which statistics are available is 1964, and in that year 339,000 pounds (heads off weight) of sea bobs taken by the trawl fishery were sold in the country, mostly in the capital city, San Salvador.

27. Another aspect of the shrimp fishery that is becoming of greater importance is the marketing of species other than shrimp, which are caught incidentally by the trawl fleet. The most acceptable varieties of fin fish are saved and brought to the shrimp plants, to be trucked to San Salvador, some 65 miles from El Triunfo by paved highway. The less desirable species are discarded at sea. No statistical breakdown by species is available. The following figures represent the sales of all species of seafood (except shrimp) landed by the shrimp fleet (source: Fisheries Section, Ministry of Economy):

PRODUCTION OF SEAFOOD BY
SHRIMP FLEET (SHRIMP NOT INCLUDED)

(In 1,000 pounds)

1958	1,132	1962	2,013
1959	854	1963	2,594
1960	1,351	1964	3,090
1961	1,729		

28. Although the fin fish constitute a profitable sideline for the shrimp industry, and go a long way toward overcoming the chronic shortage of animal protein food in

the national diet, the spiny lobster is the most valuable single by-product of shrimp trawling. No specific production figures are available, and lobster catches are included in the figures for "other species" above. As in Panamá, Ecuador and the Caribbean Coast of Nicaragua, the shrimp trawlers make substantial catches of spiny lobsters in the course of their normal shrimping operations. The lobsters are headed aboard ship, as are the shrimp, and brought to the plants. There they are sorted out, frozen individually, packed in cartons, and shipped along with the shrimp to the United States. There is also a small trap fishery for lobsters.

29. During the earliest days of the industry, over 90 per cent of the shrimp were shipped to the United States by air. In 1960, this method of shipment declined to 50 per cent, and in 1961 air shipments dropped to 30 per cent. In 1960, shipping by refrigerated steamship to the U.S. West Coast commenced. During that year and in 1961, approximately 40 per cent of the shrimp moved by steamer. From the outset, small amounts were shipped overland by truck to the Caribbean Coast of Guatemala, and thence to the U. S. by ship. At present, most of the shrimp and lobsters are shipped by refrigerated truck-and-trailer to Puerto Matías de Gálvez, on Guatemala's Caribbean Coast, a distance of 410 road miles from El Triunfo. Here the loaded trailers are placed aboard the ferry for Miami and the returning empties are picked up. This economical method of transport, which eliminates multiple handling and pilferage en route, is rapidly being adopted by all the Central American fisheries. Some shipments are still made by air from San Salvador to Los Angeles.

30. The outlook for the shrimp industry of El Salvador is excellent. It should be possible to maintain the production of white and brown shrimps with a fleet of the present size. Some observers favor cutting the number of vessels somewhat, feeling that a smaller fleet could catch the same amount more profitably. Some in the industry feel that the present flat-rate export tax of six cents should be modified to provide for a lower tax on the lower priced small sizes. They argue that there is now no incentive to produce pinks and sea bobs, and only a tax cut will result in better utilization of these species. A new tax structure is under study, but changes are in abeyance while awaiting the cost results of the peeling-deveining machine which creates a higher priced product (I.Q.F.) economically.

31. Greater utilization of the small sized shrimp is inevitable. In Panamá and Ecuador, for example, the titís and tigres are now the backbone of the industry, and the fantastic development of the immense fisheries off the Atlantic Coast of South America is based almost entirely on the pink shrimp. Until the fleet fishes regularly out to 35 fathoms and deeper, the production of pinks is not apt to grow significantly. Limited exploration in deeper waters has indicated the presence of a possibly large resource of royal red shrimps also.

32. In his report to the Government of El Salvador (from which much of the material in the foregoing paragraphs was obtained), the F.A.O. expert recommends holding the fleet to its present strength of 73 vessels for harvesting white and brown shrimps. He also suggests that consideration be given to licensing additional boats to fish for pink shrimp only. With the industry being concentrated in one port, and with only two plants and fleets involved, this type of operation would be easy to administer. It would seem to be the best available way to achieve growth without damaging the resources.

D. HONDURAS 1/

1. Honduras has no developed shrimp fishery on the Pacific Coast, nor is one likely to become established in the future. The reason is simple: Honduras has no coastline on the open ocean; the entire 40 miles of coast lie at the head of the Gulf of Fonseca. Although the tributary estuaries are nursery grounds for juvenile shrimp, there are no suitable trawling grounds in the Honduran portion of the gulf. El Salvador and Nicaragua have jurisdiction over most of the outer part of the gulf, and over the ocean coastline on either side, and their laws do not permit fishing by foreign-based boats, including Honduran.

2. A small-scale fishery on a subsistance basis has always existed along the shores of the gulf and in the tributary estuaries and lagoons. The local inhabitants, using cast nets, take mostly juvenile white shrimps. In 1956 it was estimated that the annual catch was approximately 50,000 pounds, heads-on weight.

3. Although no statistics are available, it is likely that the catch is considerably larger now. A fishermen's cooperative has been organized at San Lorenzo, and it makes frequent shipments of fin fish and shrimps to the capital city of Tegucigalpa.

1/ The survey of the fishery in Honduras was completed in April 1965. This date is implied in all references to current operations, unless otherwise noted. For a description of the shrimp fishery of the Caribbean Coast of Honduras, see Section III-B.

E. NICARAGUA 1/

1. Nicaragua has a coastline on the Pacific of about 190 miles. Three ports are available for shrimp operations: Corinto in the north; Puerto Somoza, about 65 miles down the coast; and San Juan del Sur, near the Costa Rican border.

2. Shrimp are found along the entire coast. However, rocky bottom near shore limits the boats to depths greater than about ten fathoms along much of the coast. In most of their range, the white shrimp are fished heavily in lesser depths; hence the unsuitable bottom near shore probably limits the potential catch.

3. Fishing for large shrimp in the Gulf of Fonseca is reportedly not very good, although the smaller chacalines are said to be abundant. The fishing grounds extend all the way from Pt. Cosiguina, at the entrance of the gulf, to the Costa Rican border, with only a few short gaps. Trawlers from El Salvador occasionally stray across the gulf to Nicaraguan waters, and likewise the boats from Corinto are tempted to try the rich grounds off their neighbor's coast -- at least according to the charges and counter charges that are made.

4. The Pacific fishery commenced in September 1961, when a fleet of 25 trawlers moved into Corinto. Soon thereafter construction was started on a freezing plant at that port. Prior to its completion, about 1963, the shrimp were shipped fresh. They were chilled with ice, packed in burlap bags, covered with plastic and trucked to Managua, a distance of about 80 miles. Here they were transferred to chartered planes and flown to Brownsville, Texas, for packaging and freezing. This was a prohibitively costly procedure, as the shrimp could not be accumulated and held for inexpensive bulk shipment. The total transportation cost was estimated at 21 cents a pound, compared to approximately 5 cents for packaged frozen shrimp shipped by regular air carriers.

5. Meanwhile, a small operation commenced in Puerto Somoza about 1962 with two trawlers. For the first year or two, their catches were trucked to the parent company's plant in La Unión, El Salvador, for freezing.

1/ The survey of the fishery in Nicaragua was completed in May 1965. This date is implied in all references to current operations, unless otherwise noted. For a description of Nicaragua's shrimp fishery in the Caribbean see Section III-C.

6. The extent of the Nicaraguan shrimp fishery is indicated by the United States Customs figures on imports, in as much as practically all of the production is exported to the United States. The following table shows all imports of shrimp, from both coasts, including the years before the large scale fishery commenced. The figures are mostly heads-off, shell-on weights; however, an increasing proportion is shipped peeled and deveined.

IMPORTS OF SHRIMP FROM NICARAGUA (BOTH COASTS) TO THE UNITED STATES

(In 1,000 pounds)

1953	3	1960	266
1954	1	1961	803
1955	8	1962	1,971
1956	0	1963	1,611
1957	1	1964	2,520
1958	278	1965	3,155
1959	213		

7. A breakdown of Pacific and Atlantic production was obtained from the Nicaraguan Director of Natural Resources, Ministry of Economy, which showed that in 1964, the Pacific coast produced about one-third of the nation's shrimp exports. The Government's export figures are considerably higher than the United States import figures; however, they indicate the relative production of the two coasts. They are as follows (in 1,000 pounds):

	Pacific Coast	TOTAL	% Pacific Coast
1962	1,593	2,787	57.2
1963	1,085	2,273	47.7
1964	1,229	3,543	34.7

8. The American financed operation at Corinto was apparently overextended. Because of the sad experience of Nicaraguan investors with the French operation that commenced on the Atlantic Coast in 1958 and subsequently went bankrupt,

they were reluctant to advance credit for the Corinto plant. Finally, the original American operator departed, and others took over the fleet and the plant. Thirty percent of the stock is held by Nicaraguans, the remainder by Americans. The company still carries the name of the original operator, although he is no longer connected with it (Manuel A. Sanchez Jr., Cia. Ltda., Sucrs.).

9. The fleet has dwindled to 18 trawlers, all still flying the United States flag. At the time that the management changed, the Mexican captains were sent home under circumstances that reportedly caused hard feelings, and were replaced by Panamanians.

10. The boats at Corinto are becoming old and need frequent service.. There is no parts depot and no service facility. Hence the boats have difficulty operating efficiently. Very few can fish as much as 22 days a month. As there are insufficient spare nets, the boats have to return for net repairs after about five days at sea (elsewhere trips are usually from 10 to 14 days). The usual catch is around 275 pounds per day, and boats that should be able to catch 10,000 pounds a month seldom go over 5,000. As a result, the plant which at first produced 100,000 pounds per month, operates at a much lower level. 1/

11. The fishing grounds extend from the entrance of the Gulf of Fonseca south to Puerto Somoza. The former manager of the plant at Corinto estimates the potential productivity of this area at two million pounds a year.

12. The plant at Corinto produces two general kinds of shrimps: the large, which are known locally as "camarón", and the small sea bobs, which go under the local name of "camaroncillo." Although the fame of Nicaraguan shrimps was based originally on the "under ten to the pound" whites, the plant depends to a great extent on the smaller species. For example, sampling by F.A.O. scientists during part of 1964 showed the following proportions of the two types (in thousands of pounds):

	CAMARON	CAMARONCILLO	TOTAL
June	57	28	85
July	41	51	92
August	71	37	108
September	63	21	84
October	41	42	83

13. Most of the large shrimps or "camarones" are whites. All three species are represented. Penaeus occidentalis and P. stylirostris, both of which are known locally as either "blanco" or "blanco azul," are taken only in the large sizes.

1/ In October 1966 it was reported that Pezca, S. A., of El Salvador has become associated with the Corinto operation. Several Panamanian boats, with Portuguese captains, have been added to the fleet and operations have increased greatly.

They run mostly under 10 to the pound, with some 11 to 15. P. vannamei, which is called "blanco" only, is caught at all sizes. Some are taken at the large sizes, about 40 per cent are 16 to 20, and many are smaller. All three species are grouped together for packing, with sorting based only on size.

14. Some of the large shrimp are browns, P. californiensis, called "cafe". There are two color phases. The browns are taken in all sizes. The majority are "under 30," with many "under 10." The few pinks that are taken are called "rosados", P. brevirostris.

15. Two species of camaroncillos are taken: the "titi", Xiphopeneus riveti, and the "tigre", Trachypeneus byrdi. Both are called "chacalín" in the Gulf of Fonseca

16. The plant at Puerto Somoza is Pesquera Centro Americana de Nicaragua, S. A. It is very small, and with its fleet of six boats produces up to about 10,000 pounds per month, which is somewhat below its capacity. Repair and service facilities at Puerto Somoza are said to be somewhat inadequate.

17. One or two boats at San Juan del Sur take shrimp along with fin fish. These are consumed locally or shipped to Managua.

18. Until recently, Pacific Coast shrimp were shipped by refrigerated trailer to Puerto Matías de Gálvez on the Caribbean Coast of Guatemala, and thence by ferry to Miami. The recent extension of the Rama Road from Managua toward the Nicaraguan east coast makes an alternative route possible. Now the trailers take the new road to the river port of Esperanza. Here the trailers are placed aboard LSM's for the trip down the river and across to Miami from Bluefields, by the Mamenic Line. The transportation cost is five cents per pound.

19. All shrimp operations, for export, are under exclusive concessions granted by the Government. The concessions are granted only to companies that are owned partly by Nicaraguans and that can demonstrate that they are physically and financially capable of operating. The concessionaires may import boats, machinery, parts, and equipment, duty free. The vessels may remain under their own flag, as long as they fish for the concessionaire. If the owners so desire they may transfer to Nicaraguan registry. Local fishermen who wish to fish for shrimp, (except for domestic consumption) must deliver their catches only to the concessionaires.

20. The export tax on all shrimp, regardless of size or species, is three cents a pound.

21. It is probable that the fishery on the Pacific Coast will never produce more than two million pounds annually, if that much, even if a modern fleet were placed in operation. It is entirely possible that exploratory fishing in depths beyond those that are now exploited would disclose a sizeable resource of pink shrimp. If so, the industry could expand beyond the two million pound level. Such exploration would necessitate a large investment in vessels and gear, which might not turn out to be a profitable venture. Most likely the present moderate production of white shrimp and sea bobs will continue without much likelihood of expansion.

F. COSTA RICA 1/

1. The Pacific coastline of Costa Rica differs from the coasts of the Central American countries to the north in several respects. First, it is by far the longest, over 360 miles. Second, it is broken by a series of peninsulas and gulfs, unlike the virtually straightline coasts of the other countries. Finally, in all its length, it has but one fishing port of any consequence, Puntarenas, which is located midway between the borders with Nicaragua and Panamá. Although Golfito in the south has potentialities for fishing, it is at present only a shipping point for bananas.

2. Shrimp are found along most of the coast, although fishing grounds are interrupted by stretches of rocky bottom. The extensive Gulf of Nicoya is the center of abundance. Other grounds are to the south in the open Bay of Coronado and in the Gulf of Dulce. Elsewhere, the precipitous nature of the coastline limits both nursery grounds and trawling areas. The inner part of the Gulf of Nicoya is reserved as a nursery area for juvenile shrimp, and trawling therein is prohibited.

3. Costa Rican shrimping commenced on a small scale in 1952, with a catch of 95,000 pounds and exports to the United States amounting to 21,000 pounds. The industry, which was centered then as now in Puntarenas, grew slowly and did not reach the million-pound level until 1959. The fishery was first developed to take advantage of the very large white shrimp found near Puntarenas in the Gulf of Nicoya and the adjacent open sea. In the early days, about 75 per cent of the whites were "under 15 to the pound", and 25 per cent were "16 to 20." These very large sizes still predominate.

1/ The survey of the shrimp fishery in Costa Rica was completed in May 1965. This date is implied in all references to current operations, unless otherwise noted. At present, Costa Rica has no shrimp fishery on the Caribbean Coast.

4. The shrimp fleet consisted of six or seven small trawlers in 1954. This number had increased to 21 by the end of 1955, and to 32 by February 1956. The number of active boats remained more or less constant through 1959. In November 1959, the active fleet consisted of ten vessels from 55 to 60 feet in length, and 18 boats from 25 to 40 feet. During the early years, foreign flag vessels were allowed to fish under permit. At present, only Costa Rican boats may fish for shrimp. In fact, all new boats must be built in Costa Rica, and the hulls and superstructure must be constructed of domestically produced materials.

5. In February 1965, the active fleet consisted of 52 trawlers of three classes. Fifteen vessels are classified as large (plus one out of service). These range in length from 56 to 75 feet. All of the large vessels fish with two nets in the typical double boom, double rig manner. All but two are equipped with echo sounders, and three have two depth finders. The 22 medium sized vessels range from 45 to 55 feet in length. Four of them still fish with single nets. Twelve have echo sounders. The 15 small boats range in length from 30 to 44 feet. All but one fish with single nets, and only two have depth finders. The small boats fish close to port and make a relatively small contribution to total production.

6. The boats are owned by local fishing companies and individuals. Only a few of the newer ones could be called modern and efficient when judged by the standards prevailing in neighboring countries. Until additional modern vessels, capable of fishing in deeper water and farther from port, are put into service, production is not likely to increase much above present levels.

7. The several boatyards in Puntarenas not only build shrimp boats, but provide adequate haul-out and repair service for the fleet.

8. From 1956 through 1964, there was only one freezing plant at Puntarenas. In addition, several small home-type freezers were operated in the early years. The big plant froze, packaged and stored shrimp for other exporters. The original plant, Productos Altamar, Ltda., is still by far the largest freezer. The plant, which is owned by U. S. interests, has been modernized with semiautomatic grading and processing equipment and refrigeration facilities. However, the plant does not compare with freezers of similar size in other countries, as concerns equipment, space, working conditions or operating procedures.

9. A smaller freezing plant, which is locally owned, is Compañía Industrial de Mariscos. An American firm, Henderson Portion Pack, operates a small rented plant Henderson, which became an affiliate of Borden Foods in 1965, was constructing a small but modern freezing plant in mid-1966.

10. The growth in Costa Rica's export shrimp industry is shown in the following table. The first two columns represent imports into the United States, by weight

and value, as taken from U. S. import figures (which are used throughout this report for comparative purposes). The second pair of columns represents all exports from Costa Rica, by weight and value, as taken by the Central Bank of Costa Rica from governmental statistics. Practically all exports go to the United States, and there is no explanation for such discrepancies as are shown.

EXPORTS OF SHRIMP FROM COSTA RICA

YEAR	IMPORTS TO U.S.		TOTAL EXPORTS	
	1,000 Pounds	1,000 Dollars	1,000 Pounds	1,000 Dollars
1952	21	10	+	+
1953	46	39	+	+
1954	43	22	+	+
1955	141	72	176	75
1956	421	205	492	216
1957	227	99	230	98
1958	717	370	439	267
1959	1,157	585	776	365
1960	461	241	634	268
1961	1,321	736	1,620	743
1962	1,671	869	1,738	786
1963	1,508	814	1,790	766
1964	1,976	1,192	2,471	1,159
1965	1,754	+	+	+

+ Figures not available.

11. The above figures for weights are heads-off, mostly with shell-on. Growing quantities, particularly of the smaller sized shrimp, are shipped as peeled and deveined. In 1964, for example, 255,000 pounds of the total imports into the United States from Costa Rica were peeled (mostly uncooked, but some in airtight containers). This represented a value of $109,000.

12. The shrimp that are taken for export are predominately the large white varieties. By far the most important species is Penaeus occidentalis. In 1959 it was estimated that this species accounted for two-thirds of the production of whites. The remaining one-third was almost all P. stylirostris, with a very small contribution of P. vannamei and P. californiensis. The industry and the fishermen do not distinguish the species, and all are called whites (blancos) or large shrimp (grandes). None of the whites are smaller than 25 to the pound, and a very high proportion is still less than ten to the pound.

13. In 1960, the fleet commenced to take pink shrimp, Penaeus brevirostris, on a small scale. Extensive grounds for the pinks, known locally as "rosados", are said to be located north of Puntarenas. However, most of the boats are not equipped to fish for this species in the relatively deep waters where it is customarily found. Although scarcely exploited now, the pink shrimp exists as a potential resource which is probably capable of producing a rather large tonnage. The pinks are considerably smaller than the whites. They run from 16-20 to the pound (heads-off weight), all the way to 61-70 to the pound, with a considerable proportion at 41-50.

14. The sea bobs, which appear to be very abundant, are taken mostly for the domestic market. With the increasing popularity of peeled and deveined shrimp, these small varieties are bound to play a larger part in the export industry. All four species are taken: Xiphopeneus riveti, Protrachypene precipua, Trachypeneus byrdi, and T. faoe. It was estimated in 1959 that the first named of these made up most of the production. All are grouped together by the fishermen and plant operators as "brown shrimp," a terminology not used elsewhere. Government statistics refer to them as small shrimp (pequeños). The sea bobs are very small, tail weights averaging 50 to 70 to the pound.

15. The production of the shrimp fleet at Puntarenas, by species, is shown in the following table. The figures were furnished by the Fishery and Wildlife Section of the Ministry of Agriculture and Livestock.

COSTA RICAN SHRIMP CATCHES

Heads-off Weight, in 1,000 Pounds

YEAR	LARGE (Blanco)	PINK (Rosado)	BROWN (pequeño)	TOTAL
1952	96	-	-	96
1953	113	-	-	113
1954	135	-	-	135
1955	336	-	-	336
1956	424	-	95	519
1957	196	-	175	371
1958	791	-	140	931
1959	1,103	-	268	1,371
1960	455	113	518	1,086
1961	848	141	1,211	2,200
1962	604	445	1,228	2,277
1963	671	374	1,362	2,407
1964	1,165	188	1,360	2,713

16. The above figures demonstrate the usual history of the Pacific Coast shrimp fisheries: a rapid growth based on production of white shrimp, followed by a partial substitution of pinks when the catches of whites level off. As usual, the production of sea bobs increases to take care of growing domestic consumption and to augment exports. It would appear that with the present fleet and fishing practices, both catches and exports are about at their maximum.

17. Most of the white shrimp are headed aboard the vessels and delivered heads off. However, some taken during the last day of a trip, especially on the smaller boats, are landed without heading. Most of the small shrimp are landed heads-on. These are taken to a great extent by the "mosquito fleet" of small boats fishing close to Puntarenas. However, a minimum of ice is used, and the quality of the heads-on shrimp leaves something to be desired.

18. The boat owners and the fishermen share in the proceeds of the catches. The crews, consisting of four or five men, provide their own food. They receive 25 to 33 per cent of the gross proceeds, depending on the type of boat, with the owners keeping the higher percentages on the larger and better boats. During 1964,

the plants paid the following average prices per pound (heads off weight): 64 cents for whites; 26 cents for pinks (this varied from 15 to 45 cents, dependin on size); and 10 cents for the sea bobs or browns. The catch in 1964 consisted of about 45 per cent large, 7 per cent pink, and 48 per cent small, and the Government estimated that the fishermen and boat owners received almost a milli dollars for their catches in that year. In addition, considerable quantities o fin fish are landed by the shrimp fleet. The fish, which are sold on the domestic market, bring additional income to the fishermen and plant operators.

19. Costa Rican shrimp are shipped to the United States in a variety of ways. Some are shipped directly from Puntarenas by refrigerated cargo ship. Until recently, the majority was shipped to Miami by air. Now a considerable portion goes by refrigerated truck-and-trailer to Puerto Matías de Gálvez on Guatemala's Caribbean Coast, a road distance of about 935 miles, and thence to Miami by fer

20. The method of air shipment is typical of shipments from other areas. Plan load lots are carried aboard the DC-3's and C-46's of LACSA, the national air line, direct from Puntarenas. Because the aircraft are loaded with other cargo on southbound flights, the planes which would otherwise return northbound empty can carry shrimp quite economically (about five cents a pound). The unrefriger plane takes off from Puntarenas and ascends as rapidly as possible to an altitu where the outside temperature is below freezing. The vents are opened and the cargo space becomes, in effect, a cold storage plant. After a quick refueling stop at Grand Cayman in the West Indies, the process is repeated. The shrimp arrive in Miami as good as when they leave. If less than a planeload is involv the shrimp are sent to San José by truck, a distance of 75 miles. At the International Airport of Los Cocos they are transferred to planes of LACSA or P for the flight to Miami.

21. The export tax amounts to two per cent ad valorem, plus approximately one-quart of a cent per pound ($0.00226). The ad valorem tax has the effect of an incentive for exporting the smaller, lower-priced pink shrimp and sea bob.

22. As noted above, all fishing boats are required to be of domestic manufactu and must contain a maximum of domestically produced materials. Otherwise, howe there is no import tax on any equipment or supplies used in fishing or packing shrimp, provided that domestically manufactured items are not available.

23. Costa Rica claims jurisdiction over territorial waters that extend 200 nautical miles seaward from the coast. However, the Supreme Court, in deciding on a case that had no bearing on fishing, cast some doubt on the validity of the claim. At present, it would seem that the extent of the area over which fishery

authority is actually exercised is somewhat in doubt.

24. The Costa Rican shrimp fishery is capable of further growth but it can never be expected to rival the fisheries of El Salvador or Panamá in size. It would appear that the white shrimp resource is being exploited about to the limit. Perhaps intensified fishing in the extreme north and south, beyond the range of most of the present fleet, might disclose new resources. Meanwhile, the catch of whites will depend largely on abundance, which will fluctuate depending on the success of reproduction from year to year, which in turn depends on environmental factors. The pink shrimp is a question mark. If indeed a good resource exists, it can be drawn upon to augment production, particularly in years when white shrimp are scarce.

25. Many observers, both within the industry and outside, believe that no expansion is possible without upgrading the fleet. The introduction of modern boats to replace the most inefficient members of the existing fleet is necessary. This would depend, it is said, on the provision of subsidies or loans at reasonable interest rates, and it has often been suggested that the law requiring local construction of boats be rescinded. It has also been suggested that improved gear for deep water fishing be financed by the government.

26. It has been noted by several observers that Costa Rican shrimp generally sell for lower prices than shrimp of equal size from other areas (as much as ten cents per pound). This is attributed to lower quality, which results from deficiencies in equipment and procedures. These observers recommend better equipment, use of chlorinated water, more ice, and the rejection of sub-standard shrimp. Inadequate ice is probably the most important. Conversion of the boats to brine refrigeration, as in neighboring areas, would undoubtedly result in better quality. It is expected that the new Borden plant, which is under construction (1966), will set an improved standard of quality.

G. PANAMA 1/

1. The most extensive and most productive shrimp fishing grounds south of México are those along the Pacific Coast of Panamá. They were also the first to be

---

1/ The survey of the shrimp fishery in Panamá was completed in May 1966. This date is implied in all references to current operations, unless otherwise noted. At present, Panamá has no shrimp fishery on the Caribbean Coast.

exploited on a large scale. From 1950 through 1964, Panamá was second only to México as an exporter of shrimps to the United States. In 1961, El Salvador briefly challenged, but then fell behind. Venezuela's rapidly developing fishery surpassed Panamá in 1965, but it collapsed in 1966. Only India appears destined to stay ahead as the Number Two exporter. India's shipments came close to passing Panamá in 1963 and 1964, and went far ahead in 1965 and 1966. With almost unlimited resources, India's fishery should continue to expand, while Panamá has already reached the limit of its potential production.

2. Shrimp are found along most of Panamá's sinuous and island-studded coastline of 700 miles, which is the longest coast under one jurisdiction between México and Perú. The principal fishing grounds are in the Gulf of Panamá and the Gulf of Chiriquí, the two principal indentations in the coast. The rocky stretch of a hundred miles between the two gulfs and the 60-mile stretch near the Colombian border are largely unproductive. Some of the best fishing is within sight of Panamá City, and tourists flying in or out of Tocumen International Airport or visiting the ruins of Old Panamá can often view the shrimp fleet in action. Panamá City is the nation's largest shrimp port, in fact it is one of the most important shrimp centers of the world. The other port is Pedregal, the harbor town for David, near the Costa Rican border.

3. Although shrimp fishing in Panamá with cast nets and seines dates back to ancient days, modern trawling had its first beginnings about 1946 when one boat started fishing for the local market. Visiting tuna fishermen from the United States saw the very large shrimps that were caught, and sent samples to American importers. These were well received and a new industry developed rapidly. The first shipments were made in 1950, and within a year the fishery was booming. By 1955 the shrimp fleet had grown to 90 vessels, and four freezing plants were in operation.

4. The Panamanian fishery started with United States capital. In 1953 most of the companies then operating were bought out by Panamanian interests. At present, six freezing plants are locally owned and the seventh is U.S. owned. No difficulties are placed in the way of foreign ownership, although foreign investors are required to form a Panamanian company. At first, all the boats were from the United States. These were mostly typical old style Mississippi coastal single-net trawlers, along with a few West Coast conversions. Since 1953, only boats built in Panamá have been permitted to operate.

5. By 1955 the several boatyards in Panama City were busy building shrimp trawlers, with 15 under construction in November of that year. About that time, the typical Panamá-type boat evolved, which has since spread to Ecuador and

El Salvador. This craft is essentially based on the Florida trawler, is 55 to 65 feet in length, and is of wooden construction. Traditionally, Panamanian trawlers are painted black, with a white superstructure, but recently a few white vessels have appeared. The first steel trawlers were built in 1955, but steel craft did not become popular until lately when a slight trend toward steel became evident. All the vessels fish with two nets, most of them with the usual two booms slung from the mast. However, many rig the booms on the outboard rails. This form of rigging is preferred by some owners, and is more prevalent in Panama than elsewhere. All vessels are equipped with brine refrigeration instead of carrying ice.

6. Because of attacks from shipworms, the wooden trawlers need frequent service, and seldom can continue in operation more than ten years. Consequently the several very good boatyards in Panamá City are kept busy with service and building replacements; in fact it is usual to have to await one's turn for haul-outs. One result is very efficient service: one yard that is operated by a freezing plant solely for its own fleet can accomplish a complete haul-out in 24 hours -- replacement of planks, plugging worm holes, caulking, and painting, as well as service on the rudder and propeller.

7. Between 1957 and 1959, the fleet underwent a tremendous and uncontrolled expansion, following exceptional fishing for pink shrimp in 1957. Already there were too many boats and the grounds were saturated. Numerous vessels had departed for the newly developed fishery in Ecuador as early as 1955 and 1956, to be followed by a migration to El Salvador and other countries. Nevertheless, boatbuilding continued almost unabated, and over 200 boats were in operation. By 1959, many of them were laid up and lay at anchor providing a feast for the worms. In 1961, about 160 boats were fishing for the six plants in Panamá City.

8. In an effort to control over-expansion, which had resulted in unprofitable boat operations, legislation was passed to limit the total fleet to 160 vessels. Nevertheless, in spite of the limitation, the fleet continued to expand until as many as 210 vessels were operating in 1963, following the unauthorized issuance of a number of new licenses. In 1965 a total of 250 shrimp vessels was authorized, including replacements for the dozen boats that were diverted to the fish meal fishery. It had been hoped by some in the industry that these boats would not be replaced. Several boats were under construction in 1965, and 38 licenses were still outstanding. The best estimate for vessels in actual operation is 200. New construction is just about keeping pace with losses due to sinking and wearing out.

9. Vessel ownership is divided between the packing companies and individuals. For example, one of the largest plants in Panamá City owns 18 trawlers, the family that owns the plant also owns 7 boats, and 30 vessels belonging to individuals deliver to the plant under contract. Another large plant owns 22 boats, and has 15 private boats delivering to it. The plant at David owns 14 boats through an

affiliated company, and engaged another fleet of about 5 boats to fish for it in 1966. Generally speaking, company and family owned boats receive preference in unloading and boatyard service. Also when the plants are swamped with shrimp they will accept the small sized titís and tigres only from their own boats. Most fleets are standardized as to engines, auxiliaries, and other equipment to facilitate service and replacement of parts. Caterpillar engines predominate, but some fleets are powered by Cummins engines.

10. As a general rule, the boat owner hires the captain, who in turn hires the four men in his crew. All are paid in shares, based on the value of the catch. All captains and fishermen are Panamanian. Experienced Panamanian skippers and crew men are in demand in other areas and can be found in the fleets of several countries.

11. Six freezing plants are in operation in and near Panamá City. All of these a owned entirely by Panamanians. Four of the plants are located downtown on the waterfront near the municipal market. These are: Compañía de Mariscos Islas de las Perlas, S. A.; Panamá Packing Corporation; Carlos Cambra e Hijos, S. A.; and Cambra Hermanos, S. A. Another, Pescadora, S. A., is located on the bay at Paitilla in the suburbs. The sixth, Compañía de Productos Crustaceos, S. A., is near the mouth of Río Juan Díaz, close to Tocumen Airport. The plant in David, 230 miles west of Panamá City, is Frigoríficos de Chiriquí, S. A. This company i a U. S. owned subsidiary of Henderson Portion Pack, which in 1965 became affiliat with Borden Foods.

12. The plants in Paitilla and David were designed specifically for shrimp freezi and are well laid out to take advantage of their floor space. Most of the downtown plants evolved from small beginnings and are badly cramped for space. A are operated well, and sanitary conditions are satisfactory.

13. Three of the downtown plants have no company owned fleets, and buy only from private boats. Several American exporters, who have no boats or freezing facilit of their own, buy shrimp from private boats and have them frozen and packed to order by one or another of the plants listed above.

14. Nearly all of the plant owners, most of the individual boat owners, and some of the boatyards, ship chandlers, etc., have banded together in a national association to promote the fishing industry and to sponsor helpful legislation: Asociación Nacional de la Industria Pesquera Panameña. Because the fishing indus is centered in the shrimp fishery, which accounts for almost all of its total val shrimp interests dominate the association. However, the growing fish meal industry is represented and works closely with the shrimp members.

15. In as much as the greatest part of the Panamanian shrimp production is exported to the United States, the official U.S. import statistics, which are presented below, give an accurate picture of the growth and present magnitude of the industry which provides Panamá with its second most important export product (banana being first). In the following table, imports originating in the Canal Zone are included as products of the Panamanian fishery.

IMPORTS OF SHRIMP FROM PANAMA TO THE UNITED STATES

YEAR	WEIGHT (1,000 Pounds)	VALUE (1,000 Dollars)
1950	304*	168**
1951	1,876	1,129
1952	3,903	2,356
1953	3,943	2,986
1954	3,660	2,476
1955	4,265	2,815
1956	5,962	4,323
1957	8,421	6,298
1958	8,111	5,945
1959	8,869	6,300
1960	8,423	5,674
1961	9,892	6,521
1962	10,117	7,787
1963	10,571	7,164
1964	12,247	8,533
1965	10,448	6,910**

* Source: Dirección de Estadística y Censo.
** Source: International Monetary Fund.

16. The above figures for weights are heads-off, mostly with shells. For example, in 1964, almost 8 million pounds of the total exports were shell-on (with a value of $5,686,000). The remainder were peeled, raw or cooked, peeled and deveined, and butterfly.

17. The fishery developed originally to take advantage of the very large and extremely abundant white shrimp. In 1955 it was estimated that the pack of white

shrimp consisted of 33 per cent "under 10 to the pound", 50 per cent 11 to 15, 10 per cent 16 to 20, and 5 per cent 21 to 35. These proportions have been pretty well maintained. The whites include three species, which are not separated in the industry. All are called langostinos or blancos. Penaeus occidentalis is reported to constitute 85 to 90 per cent of the catch of whites, with the remainde fairly equally divided between P. stylirostris and P. vannamai. Some of the P. occidentalis are brownish or rusty color and are called "browns" but are not separated. One packer estimates that about one-fourth of his whites are these dark forms. Practically all of the whites are packed as heads-off, shells-on, and only those with black spots are shelled.

18. In 1955, it was estimated that future white shrimp exports would amount to between 5 and 8 million pounds annually. However, the tremendous increase in fishing effort since that time has not been able to produce that much. All areas where white shrimp are found are now exploited to the utmost. Catches, which depend on changing abundance, have fluctuated over the past 10 years between 3.5 and 5 million pounds (heads-off weights), as noted below in Paragraph 23. The Director of Fisheries predicts that during the next few years the production of whites will average 4.3 million pounds. The whites not only vary in abundance from year to year, but seasonally also. The best catches are usually made during the period from April to September.

19. The pink shrimp, Penaeus brevirostris, is known in Panamá as camarón rojo. This medium sized species runs from 26 to 50 to the pound, with some as large as 21 to 25. Because of its smaller size, the pink does not command as high a price as the white and also requires more work in packing. Being a deeper water species it costs more to catch. Hence, in Panamá, this species is considered as merely a supplement to the white, albeit a valuable one. In general, the boats are sent out for pinks only when the production of whites is off, or during the occasional tremendous "runs" when large numbers can be caught readily. These periods of abundance are erratic and can occur at any time of the year. Abundance also varies from year to year. The industry still talks about the tremendous production of over three million pounds of pinks in 1957, which resulted in the building of many new trawlers. In following years, production fell off badly (less than one-tenth in 1958) and the industry realized that it had overexpanded. During the period 1960 through 1965, catches of pink shrimp fluctuated between 1.8 and 3.4 million pounds (heads-off weight). In 1966, the Director of Fisheries estimated that future production would range between 2.5 and 3 million pounds.

20. Four small species of shrimp or sea bobs, known collectively in Panamá as camarones, constitute an important part of the shrimp catch. Two of these are called titi: Xiphopenaeus riveti and Protrachypene precipua. The titis are very small, usually running 60 or over to the pound, heads-off. All but the largest individuals are packed as peeled and deveined. Although low in price compared to

the large shrimp, the titís find a ready market. Some plant owners consider them the backbone of their operation, or their "bread and butter earners." Catches during the period 1960-1965, inclusive, ranged from 4.4 to 7.1 million pounds (heads-off, shells-on). The Director of Fisheries believes that future catches should average five million pounds.

21. The other two small species are Trachypeneus byrdi and T. faoe, which are known by the names of tigre, carabalí, indio, or zebra. The tigres are slightly larger than the titi, generally running "under 60" to the pound, heads-off. Although most of the tigres are peeled and deveined, a specialized market exists in Miami for these shrimps with their striped shells intact. Production of tigres increased steadily from 320,000 pounds in 1960 to 830, 000 pounds in 1965. The latter figure is about the maximum production estimated for the future by the Director of Fisheries.

22. A bright colored "royal red" shrimp is taken in waters somewhat deeper than the similar pink or "rojo". This shrimp, which is probably Sicyonia florea, is not particularly desired by the packers because of the poor yield of meat when cooked. However, a considerable potential resource apparently exists. Those that are delivered to the plants are mixed in with the pinks. The fishermen and packers refer contemptuously to this shrimp as the "fidel", a name which has spread up and down the coast to neighboring countries.

23. The amounts of the several varieties of shrimps landed by the trawl fleet during the period 1954-1965 are shown in the following table.

PANAMA SHRIMP CATCHES

1,000 Pounds, Heads-off Weight.

YEAR	WHITE	PINK	TITI	CARABALI	TOTAL
1954	3,288	4	367	-	3,659
1955	3,319	34	780	3	4,136
1956	4,455	399	1,286	69	6,209
1957	4,268	3,163	2,095	195	9,721
1958	3,737	298	4,952	319	9,306
1959	4,298	1,000	5,228	781	11,307
1960	4,068	1,845	4,365	324	10,602
1961	4,625	2,586	4,444	461	12,116
1962	4,558	3,402	4,814	510	13,284
1963	3,463	2,901	5,287	659	12,310
1964	5,034	2,510	7,119	893	15,556
1965	4,991	2,841	4,163	831	12,826

SOURCE: Ministerio de Agricultura, Comercio e Industrias, Departamento de Pesca e Industrias Conexas.

24. All species are taken throughout the fishing grounds, but at different depths. The whites are found close to shore, and near islands, at depths from 3 to 15 fathoms, usually along the 12-fathom line. The pinks are taken at about 30 fathoms, with some out to 45 fathoms, especially the fidels. The titís and tigres are caught in shallow waters, particularly near river mouths. Little exploratory fishing has been conducted at depths greater than 50 fathoms. It is possible that additional resources exist in the deeper waters.

25. The trawlers based in Panamá City fish the entire Gulf of Panamá, to a depth of 45 fathoms, from Punta Garachiné in the east to Punta Mala in the west, often within sight of the packing plants. When fishing is poor, many of the boats go as far as the Gulf of Chiriquí. The vessels based at David confine their activities to the Gulf of Chiriquí and nearby waters. Even when fishing close to home, the boats make trips of at least 5 to 7 days, and trips to the Gulf of Chiriquí last 10 to 14 days. The boats at David stay out 10 to 14 days also.

26. The fishermen de-head the shrimp at sea during fishing operations. When heavy catches of titís are made, there is no time for heading them all and some are brought in with heads on. In this case they are headed in the plant. The shrimp are landed unsorted by size or species, except that when titís or tigres are delivered heads-on, they are separated from the headed shrimp.

27. When unloaded, the shrimp move by means of belt conveyor or are carried in baskets or boxes to the mechanical sorter. If landings are extremely heavy, the shrimp may at times be held in cold storage briefly before sorting. All the plants have sorting machines. Some have separate sorters for large shrimp and for titís and tigres. When the sorters get ahead of the packers during rush periods, the shrimp are held overnight in cold storage.

28. Most of the whites and pinks are packed as heads-off, shells-on. They are packed in five-pound waxed cardboard cartons, in which they are frozen after the addition of a little water to provide a glaze. Each carton contains shrimp of only one size and variety. The sizes are "under 10 to the pound", 10 to 15, 15 to 20, etc. When landings are small and the workers have time, some of the whites and pinks are peeled and deveined, and some are individually quick frozen (I.Q.F.) Preparation of these products depends somewhat on advance orders from the buyers. Broken pieces of shrimp tails are peeled and sold as "shrimp meats", at relatively low prices.

29. Most of the titís and tigres are peeled and deveined. Two of the largest plants have peeling machines, whereas this operation is performed by hand in the other plants. The peeled and deveined meats are packed in flat pliofilm bags of five pounds capacity. The bags are placed on trays for freezing, which requires 4½ hours

s noted above, some of the tigres are shipped shells-on for a specialized market n Miami, and some of the larger sea bobs are also shipped shells-on. Some pinks nd large titís and tigres are packed as I.Q.F. One of the largest markets for eeled and deveined titís is among canners of soup. Campbells alone buys 80 per ent of the production of one of the largest packers. Restaurants use most of the emainder.

0. Both the cardboard cartons and the pliofilm bags are packed in cardboard "master" artons for shipping. These contain either 50 or 60 pounds, net weight. All artons are made in Panamá.

1. As elsewhere, the shrimp trawlers catch quantities of fin fish incidentally. he boats based in Panamá City discard most of the fish at sea, as competition ith the local established small-scale market fishermen is frowned upon. The plant t David accepts fin fish. The smaller individuals are delivered mixed with the hrimp, uncleaned. These are generally distributed to the plant workers, as lsewhere. At David, the larger more valuable fish are either cleaned or headed nd cleaned aboard vessel. The crew and boat owner share in their proceeds. The ompany distributes the fish throughout western Panamá, as far east as Santiago, y refrigerated truck. An excellent market has been developed and the operators eport that the operation is profitable. The plants in both cities regularly onate fish to charity and use their own trucks to make delivery.

2. Considerable amounts of spiny lobster are taken by the shrimp trawlers, articularly those fishing in and near the Gulf of Chiriquí. The lobsters are eaded aboard the boats and delivered along with the shrimp. They were formerly old on the domestic market. Commencing in 1966, the fishermen had become well nough versed in handling techniques that the lobsters could meet export standards nd they now constitute a small-scale but valuable sideline.

3. Panamá is doubly blessed with rich fishing grounds and excellent transportation acilities. Panamá City is accurately called the crossroads of the world, with requent service in all directions by sea and air. At present, all the shippers in anamá City send their shrimps to New York City by Grace Line Sea-Trailer. hipping costs are approximately four cents a pound. Air transport was formerly sed to some extent.

4. Until recently, the plant in David shipped entirely by air, utilizing the orthbound, nearly empty, flights of cargo lines that make most of their money auling southbound general freight. Flights go direct from David to Miami. During he U. S. longshoremen's strike in early 1965, the airlines were pressed into duty o haul essential cargos that normally move by sea, and could not carry shrimp. onsequently the plant started making shipments by refrigerated trailer to Puerto

Matías de Gálvez on Guatemala's Caribbean Coast, whence the trailers are carried by ferry to Miami. Although the road distance from David to the port is 1,250 miles and not all of it is paved, the total cost is comparable to air transport (approximately five cents per pound). This method has proven so satisfactory that most of the shipments from David now go by trailer.

35. The impact of the shrimp industry on the economy of Panamá is considerable. It provides direct employment to thousands of people in Panamá City, and the business generated through purchases made by the industry provides jobs for many others. To a casual observer this can be lost sight of in a large city, but those who follow the economy and the unemployment statistics know that the shrimp fishery is vital to the well being of the city and the country.

36. The impact can be seen much more readily in the little port village of Pedregal on the outskirts of David. Before the shrimp plant was built, the only employment was at the oil docks and the tiny port. Most of the villagers made a precarious living by cutting wood along the rivers and hauling it by canoe. A dollar a day was big money. The shrimp plant has brought employment to 350 persons many of whom are former wood cutters. Most are part-time piece workers, but many are salaried. An additional 100 man the fishing fleet. The only adverse effect is that the cost of firewood has doubled, but no one cares for both the old timers and the newcomers who were attracted to town earn enough to pay for it. Many new homes have been built and old ones have been rebuilt. The merchants in both Pedregal and David are busy. Pedregal not only boasts new bars, but now has its first church.

37. The operation at Pedregal is an example of the integrated self-sufficient plant that has its counterparts in other remote towns throughout the newly developed "shrimp world." With no existing facilities except marine oil terminals and a natural harbor, the company had to build and operate everything itself. The plant and its associated fleet operating company have not only the packing, freezing and cold storage units, but a dock, ice making plant, boatyard with ways, machine shop, paint shop, and a fleet of trucks. They operate a recreation room for fishermen and employees. A company loan system is available for those who wish to save. The plant at Paitilla is similarly self-sufficient, but being adjacent to a big city it is in not quite the same situation.

38. Realizing the value of the shrimp industry, the Government has offered various inducements. The operating companies have 25-year concessions and are free from corporation taxes. There are no export taxes. As in other fields, foreigners may operate in the shrimp fishery by setting up Panamanian corporations and by using vessels built in Panamá. There is no restriction against foreigners as plant officials or employees.

39. Prospects for the future appear to be a continuation of the present. The early days of expansion and big profits are over. Both vessel and plant capacity are apparently a little more than necessary. The over-expansion of 1957 resulted in the abrupt departure of many investors, and only the best operators were able to weather the bad years through about 1961. Since then moderate profits have been possible.

40. The entire fishing area has been explored and the resources are now exploited to the fullest. It would be foolish optimism to expect any real increase in production, although further exploration beyond the 50-fathom depth may yet turn up something. Neither is any cutback in production likely. The several species will continue to vary in abundance, but these fluctuations should tend to compensate so that total annual catches will run about the same. For the sake of economic stability it is hoped that no more freezing plants are built and that the fleet does not increase further in size.

H. COLOMBIA 1/

1. Shrimp are found along most of Colombia's 500 miles of Pacific coastline, except the extreme northern part. The shrimp industry is concentrated at Buenaventura, which is located about midway between the borders with Panamá and Ecuador. Buenaventura is also Colombia's principal port for commercial shipping. A very small shrimp fishery is carried on at Tumaco, a port near the southern border.

2. For countless years there has been a small-scale canoe fishery for shrimp, for local consumption. Today's modern trawl fishery for the export market had its first hesitant beginning in 1936, and the first trawler actually started operating in 1943. In succeeding years several companies were formed, most of which failed. The original pioneer was Francisco Simsa who stayed with the struggling industry through all its ups and downs, only to pass away last year after his company had become successful. His wife now operates the plant that he founded. In the early days there were no shoreside freezing plants, and the shrimp were frozen aboard the fishing boats.

1/ The survey of the shrimp fishery in Colombia was made in April 1966. This date is implied in all references to current operations, unless otherwise noted. For a description of shrimp fishing on Colombia's Caribbean Coast, see Section III-E.

3. By 1956, the Buenaventura shrimp fleet consisted of five trawlers, three of which had freezing facilities. One shore plant was in operation. The industry began to grow the following year, and by 1958 the fleet numbered 54 boats. The maximum size of the fleet was attained in 1960, when 90 boats operated. The fleet gradually diminished to 62 in 1963, the same number as at present. Because of frequent lay-ups and general obsolescence, no more than 45 boats are ever fishing during any one month.

4. None of the boats were built in Colombia. The one boatyard in Buenaventura has only modest facilities for repairs, including one marine railway, and does not build boats. The fleet includes boats from Ecuador, Panamá, the United States and other countries. All now are of Colombian registry. Boats can be imported and licensed to fish only for licesned shrimp plants. The import tax on boats is 35 per cent. The red tape involved in importation is extremely time consuming; it usually takes three to six months to process the papers. One steel trawler was built in Buenaventura by individuals (not in the boatyard). It took several months to build, and had been waiting many months for the arrival of the engine from the United States when seen in 1966. All concerned are discouraged over further boatbuilding prospects, largely because of the impediments to importing components.

5. Most of the vessels are very old and should be replaced. All plant operators realize this and have plans for bringing in new vessels. In fact, the entire fleet of one of the plants (seven vessels) consists of U.S.-built boats less than a year old, and several others are on order. Some are the latest design steel vessels. Over the years there has been a general trend toward larger boats and most of the very small craft have dropped out. The 62 vessels in 1963 consisted of the following sizes: one under 40 feet, 10 from 41 to 50 feet in length, 38 from 51 to 60 feet, and 13 over 60 feet. Most of the boats carry ice to preserve their catches. Some of the very old boats still use their freezing equipment, and the new boats on order will be equipped with modern freezing systems. The boats fish with double nets with 45-foot openings. They fish both day and night, with daytime drags lasting an hour and a half and night hauls of two and a half hours. Trips last up to 14 days. The catch per actual boat-day of fishing averaged 205 pounds of heads-off white shrimp in 1958-59, 186 pounds in 1960-61, and 175 pounds in 1962-63.

6. Ownership is of two kinds -- company boats and private boats. In 1964, 27 of the 43 really active vessels were privately owned and 16 belonged to the freezing plants. In 1966 the four plants reported their company owned fleets as follows: 14, 9, 7, and 1, for a total of 31, or half the fleet. Two of the companies have definite plans for adding to their fleets.

7. Sixty per cent of the trawler captains are foreigners. These include Ecuadorians, Panamanians, Portuguese, and Spanish. The other captains and all engineers and crewmen are Colombians. Crews consist of four or five men. All fish on shares.

8. With minimum boatyard facilities, no parts depot, and an aging fleet, the operators have difficulty in keeping their boats in operation. All things considered, they do remarkably well. In 1963, the entire fleet averaged 12 trips or 148 days at sea per boat. One plant reported on its fleet operations in 1965 as follows: Its 16 boats averaged 17 trips and 230 days at sea, and this included one boat that did not fish at all during six months. The top five vessels caught over 50,000 pounds each, and only two caught less than 30,000 pounds. Another plant reported that its top vessels averaged 60,000 pounds in 1965, but "With new management and tighter scheduling we are doing better this year." This is the all-new fleet.

9. The number of freezing plants fluctuated in the early years, reaching a maximum of six in Buenaventura at the end of 1963. Successive failures, consolidations, and conversions to other fishery activities reduced the number to four in 1966. These are: Pesquerías del Pacífico, S. A.; Empresa Colombiana de Pesca La Polar, Ltda.; Empacadora Santa Marta, S. A.; and Pesqueros Unidos de Colombia. The first three named are Colombian owned; the fourth has 58 per cent United States capital, and is under U. S. management. A fifth plant is located in Tumaco: Pesquera de Tumaco, Ltda.

10. One of the plants in Buenaventura and the one in Tumaco are very small and their production is not very significant. The other three plants are well laid out and their operations are comparable to the better plants in other countries. Only one plant has a sorting machine. In the others the shrimp are sorted by hand. Both plan to obtain sorters, but the red tape involved in importation has discouraged them. The plants all have machine shops for repairs to plant equipment and to their boats. They also have net lockers for their fishermen. All have their own ice manufacturing plants.

11. The shrimp fishery was initiated and developed as an export industry. Both Government and industry sources estimate that 90 per cent of the production of the freezing plants is exported and 10 per cent is sold on the domestic market. All of the exports go to the United States. Hence, the growth of the industry is depicted in the following table, the first two columns of which give official United States import statistics on quantity and value. The table also enables ready comparison with other countries, statistics for which are presented in the appropriate sections. The second two columns give figures from Colombian sources, which differ slightly. All exports are from the Pacific Coast fishery, as the Caribbean fishery is strictly a small-scale operation for the domestic market.

EXPORTS OF SHRIMP FROM COLOMBIA

YEAR	IMPORTS TO U.S. 1,000 pounds	IMPORTS TO U.S. 1,000 dollars	EXPORTS FROM COLOMBIA ±/ 1,000 pounds	EXPORTS FROM COLOMBIA ±/ 1,000 dollars
1951	78	48	++	++
1952	21	13	++	++
1953	225	149	++	++
1954	343	199	++	++
1955	362	216	83	25
1956	100	77	143	57
1957	487	351	406	311
1958	891	579	1,010	442
1959	1,898	1,307	1,950	1,002
1960	2,174	1,568	2,790	1,630
1961	1,873	1,237	2,066	1,382
1962	2,207	1,592	2,360	1,497
1963	1,870	1,256	1,860	1,420
1964	1,774	1,343	++	++
1965	1,796	++	++	++

±/ SOURCES: 1955-1957, Banco de la República; 1958-1963, Fisheries Inspection Service.

++/Figures not available.

12. The above figures for weights are almost entirely for heads-off, shells-on shrimp. Probably Colombia produces less peeled and deveined, relatively, than any other exporting country.

13. The fishery has always concentrated on the white shrimp, and up to the present time practically all exports have consisted of this one product. These are large, first quality shrimp. Careful sampling by government biologists revealed the following average percentages in the various size groups during the period

1962-1963 (with small seasonal variations): under 10 to the pound (heads-off, shells-on) -- 21 per cent; 11 to 15 to the pound -- 51 per cent; 16 to 20 -- 18 per cent; smaller sizes -- 10 per cent. Obviously, the highest priced large sizes predominate.

14. The whites are called camarón blanco or langostino, and the three species are not separated in the industry. In all fishing areas and seasons, Penaeus occidentalis constitutes 99 per cent of the landings. P. stylirostris accounts for most of the remaining catch. Occasionally, especially in the dry season, this species constitutes up to 5 per cent. It is the largest of the three species. Both of the foregoing are taken in a variety of color phases. P. vannamai is taken in very small numbers.

15. The 1956 survey, which was made before the industry developed, concluded that potential production could probably reach three to six million pounds of whites per year. Government scientists have watched the catch per unit of effort drop as the number of boats increased, and rise as the fleet diminished. Accordingly, they have tentatively suggested that a fleet of 75 trawlers would be able to harvest the resource most efficiently. The industry believes that with a fleet of 75 good modern vessels, the present production could be doubled. Exports would thus be approximately four million pounds. Only modernization of the fleet, accompanied by further research, will prove whether this estimate is accurate.

16. The pink shrimp, or camarón rojo (Penaeus brevirostris) is of very little importance to the Colombian fishery. Being found in waters deeper than 40 fathoms, it is seldom caught by the fleet that fishes shallow water for whites. Very rarely a few brown shrimp (P. californiensis) are taken, but they are not distinguished from the pinks by the industry. Government figures indicate that about 5,000 pounds of pinks were delivered to the plants in 1962, and 300 pounds in 1963. As long as the boats have an adequate source of the higher priced, shallow water whites available, they are not likely to expend any effort on pinks. If and when the industry expands to the point that it has in Panamá, the resource of pinks can be exploited.

17. The smallest shrimp taken in the Colombian fishery are the sea bobs, Xiphopeneus riveti and Protrachypene precipua (which is also classified by some in the genus Xiphopeneus). These are called camarón titi in Colombia. In size they run "60 and over" to the pound. Deliveries to the plants fluctuated between 130,000 and 460,000 pounds during the period 1960-1963. They are sold primarily on the domestic market, but some are exported. Quantities are sold directly by the trawler crews to local buyers in Buenaventura and other towns, so the actual production of titis greatly exceeds the deliveries to the freezer plants.

18. Two other small species, that run 40 to 60 to the pound, are those known as camarón tigre or carabalí, Trachypeneus byrdi and T. faoe. These are not utilized

any extent by the freezing plants, whose receipts fluctuated between 19,000 and 77,000 pounds during the period 1960-1963. They are handled much the same as the titís.

. The fleet operates along most of the coast of Colombia, south of Cabo Corrientes, which is about 150 miles south of the border with Panamá. Trawling is carried on at depths from 3 to 15 fathoms, mostly less than 8 fathoms.

. The fishery operates in four well defined areas, separated by stretches of deep water and rocky coast where fishing is not possible. From north to south, the fishing zones are described in the following sub-paragraphs:

a. Zone of Cabo Corrientes (known for research and statistical purposes as Zone I). This area extends south from the cape itself to the mouth of the Río Iguá. The heaviest fishing is near Puerto Pizarro. The best season is from May to December. Most of the fishing is in the daytime, because strong winds and a heavy surf make fishing close to shore at night very dangerous. This zone is primarily a feeding area for the shrimp, which are larger than elsewhere in Colombia. Presumably they move in from the south, as there are no extensive lagoons for nursery grounds.

b. Zone of San Juan (Zone II). This area extends from Río Iguá to Punta de Piedra, which is near the entrance to the harbor of Buenaventura. The fishing grounds are similar to those farther north. However, this area has numerous excellent nursery grounds, including the estuary of Río San Juan and Juanchaco.

c. Zone of Tortugas and Timbiquí (Zone III). With the excellent nursery grounds of the rivers Raposo and Cajambre, and with extensive shallow mud flats, the area from Punta de Soldado to Timbiquí is an important fishing area. The Bahía de Tortugas is especially good. The grounds are only two hours travel from port, and fishing is good all year. Most of the fishing is in the daytime, although it is no more dangerous to fish at night in this area. Hereabouts, "trawling is carried on perilously close to the coast," according to a government report.

d. Zone of Tumaco (Zone IV). This area extends from Guapi to the border with Ecuador. With innumerable rivers and estuaries, this region has the best nursery grounds of all. Perhaps for this reason, the shrimp run smaller in the Tumaco area than elsewhere. With many dangerous shallow bars, even daylight fishing is hazardous, and little fishing is done at night. The area is fished heavily all year. In 1963 it was estimated that 57 per cent of the production originated in Zones III and IV.

21. At all plants the boats unload directly at the company dock, where they can later take on ice and other supplies. After weighing and washing, the shrimp, which have been headed aboard ship, are sorted. In one plant this operation is done by machine, in the others by hand work. They are then packed in the usual 5-pound waxed cardboard cartons. Water is added for a glaze (after weighing) and the cartons are frozen. In the plants without sorting machines, the same women do both the sorting and packing, for which they are paid about two cents a box. At this rate a good worker can make 80 cents a day. Practically the entire production, regardless of species, is heads-off, shell-on.

22. Of the three large plants, one accepts white shrimp only. The others buy and process limited amounts of titís and tigres for the national market. Packed and sold for the domestic market by all plants are the off-colored, spotted whites, broken pieces of tails, and the smallest sizes of the whites. Altogether, domestic sales amount to about 10 per cent of the total production, but all operators anticipate steadily increasing sales in the interior. Before 1963, some tigres were exported. The plant with the sorting machine definitely plans to enter the export market with both titís and tigres. This plant is affiliated with operations in Panamá where these small shrimp are very important.

23. Fishermen delivering to the plant that does not buy titís or tigres are free to sell these small shrimps to independent buyers, as are those fishing for the other plants who catch more than can be handled. These boat-side sales enter into the local market, but they do not enter into the production statistics. This practice formerly led to abuses, as the fishermen also sold quantities of white shrimp, keeping all the proceeds, part of which should have gone to the owners. The illicit sales were usually made in Tumaco and Bazán. Reportedly, this practice was corrected in 1963. (The illegal, non-contract sale or barter to other fishermen or packers, regardless of area or nationality, is the most widespread complaint of boat owners and plant operators throughout the "shrimp world," but the practice is to be expected when such a high priced commodity is involved.)

24. As elsewhere, the shrimp trawlers catch quantities of fin fish. The small ones of no value are discarded. The others are brought in for sale. Under the terms of the contracts they belong to the fishermen, not the boat owner. They are shared either half and half by captain and crew, or belong only to the captain who pays the crew somewhat less than half. The Buenaventura fish dealers gather around the boat to buy the fish while the shrimp are being unloaded. The fish are transferred to the buyers' dugout canoes in baskets of about 60 pounds.

...The United States managed freezing plant recently commenced a vigorous program to sell frozen fish in the interior of Colombia, in connection with its sales of frozen shrimp. The operators claim to have met with an excellent reception and now sell "several thousand pounds a month." Because of the mountainous terrain and consequent difficulty of transportation, coupled with inadequate freezing facilities, the price of fish in the interior cities is very high and the quality of product is rather low. The good quality frozen fish from Buenaventura has no trouble competing. This plant buys the larger sizes, better types of fish, and the "canoe buyers" take the smaller kinds for local sale.

...All exports to the United States move directly from Buenaventura on the scheduled refrigerated ships of the Flota Mercante Grancolombiana and the Grace line.

...The processing plants operate under 15-year licenses that specify that they would export 90 per cent of their production and sell 10 per cent domestically. As producers of "minor exports", they are exempt from: income and inheritance taxes; import taxes on fixtures, refrigeration machinery, vessels, parts and engines, nets and fishing gear, electrical equipment, and processing machinery; and various harbor taxes. They may also import various necessities that are otherwise prohibited entry. The red tape involved in importation and in obtaining these exemptions is monumental and time consuming. Although vessels are listed as exempt from customs duties, the importers state that they nevertheless must pay a 35 per cent tax.

...There is no export tax as such, but the required method of payment and the official rate of foreign exchange results in a de facto tax. All dollar payments for shrimp exports are made through the governmental bank (Banco de la República). The bank pays the packers in pesos at the rate stipulated for all minor or small exports (of which shrimp is one, as opposed to coffee, a major export), which is less than the open market exchange. For example, in April 1956, when the free exchange rate was approximately Pesos 18.00 per $1.00 U.S., the rate for shrimp sales was 15.50 to 1.00. This is equivalent to a tax of nearly 14 cents, U.S., on every dollar. This is far more than the direct export taxes in any other country.

...The plant workers belong to a union (Sindicato de la Industria Pesquera del Pacífico), with which the plants have contracts. At least one company maintains a school for its workers and their children, a library, and a training school for fishermen.

30. Industry leaders, who are confident that they could produce at least twice as much shrimp in the existing plants under reasonably good conditions, point to a number of impediments that increase their costs and reduce efficiency. Almost all of these handicaps, they say, are due to an indifference on the part of various governmental agencies and a lack of appreciation as to the importance of the industry as a dollar earner for the country. None had any complaints concerning the Fisheries Department in the Ministry of Agriculture; it was the myriad of other agencies involved. They described with eloquence, "Those farmers up in the hills (in Bogotá, the capital) don't know anything about fish, and they let our documents pile up this high on their desks (shoulder height)!"

31. They listed their problems as follows:

a. Not enough modern boats for present plant capacity.

b. Boats are getting old.

c. Inadequate boatyard facilities.

d. No spare parts depot.

e. No deep fishing gear to explore for pink shrimp.

f. The artificial exchange rate that amounts to a high tax.

g. Actual delays in day-to-day operations.

32. The above difficulties are allegedly caused by red tape and a general lack of encouragement, for example:

a. In addition to the high import tax on vessels (35 per cent), the paperwork requires 3 to 6 months to import a boat.

b. To import parts, engines, etc., takes 2 to 3 months; meanwhile the boat is idle. Can not order in advance to establish a parts depot, nor obtain deep fishing gear.

c. Although the vessels all operate with 5-year licenses, they are required, inexplicably, to renew them every year. Each renewal requires 3 to 4 months.

d. Several different agencies require separate documents for each entry and departure to and from the port for each boat.

The cost is minor, but delays of up to three days per clearance are frequent.

33. To offset the difficulties, there are certain advantages which the industry enjoys, and which it makes the most of. Foremost is the excellent fishing. The Colombian grounds must surely be among the best in the world. The good, low cost labor is a factor. Shipping facilities are excellent. And the exemptions from numerous taxes, although subject to frustrations, result in considerable savings.

34. The Government of Colombia has applied to the Special Fund of the United Nations for a Fisheries Development Project, and has been training scientists and making preliminary studies of the fishery resources. Both the industry and the fisheries officials are counting on the Project, if approved, to do at least two things: Determine the sustainable potential productivity of the shrimp resources, and recommend a redraft of the allegedly obsolete fishery law to unshackle the industry so it can really contribute to the national economy on a large scale.

I. ECUADOR 1/

1. The Ecuadorian shrimp fishery is one of the best developed of the Latin American fisheries and is a consistent high producer, with exports averaging over five million pounds over the last five years. Along the 500 miles of coastline, shrimp fishing is confined to the hundred miles near Esmeraldas in the extreme north and to the Gulf of Guayaquil in the extreme south. Landings are made at Esmeraldas, Playas, Posorja, and Guayaquil, with the last named being by far the most important.

2. After an abortive effort in 1951 and 1952, the shrimp fishery had its real beginning in 1954. In that year, American producers in Panamá felt that the fishery in that country was becoming overcrowded, and they moved their fleets and packing operations to Ecuador. Within a year the industry was going full blast, with 35 trawlers in operation. One floating freezer was in action, and two shore plants were located in Guayaquil and Manta.

1/ The survey of the shrimp fishery in Ecuador was made in April 1966. This date is implied in all references to current conditions, unless otherwise noted.

3. The first trawlers were all foreign-built, mostly in Panamá and the United States. They were permitted to fish for a year before transferring to Ecuadorian registry. In 1955, the boats ranged from 25 to 65 feet in length, with 30 per cent classed as small trawlers. They made trips of 6 to 8 days.

4. At present, all new vessels must be built in Ecuador. Excellent boat building facilities are available, and Ecuador exports some fishing vessels to neighboring countries. Most of the boats are built at the north coast port of Esmeraldas, where suitable lumber is available. They are brought to Guayaquil for installation of machinery, outfitting and finishing. Three distinct fleets operate in Ecuador, as described in the following paragraphs.

5. The most important group of vessels is the so-called Guayaquil Fleet, which consists of the biggest and best trawlers. The maximum size of this fleet was 73 craft, with about 68 now in operation. The number is static or even declining a little, but all replacements are larger and better vessels. In 1965, seven vessels were lost by sinking, several left the fishery, and 17 were under construction. In 1964, the size range of the Guayaquil trawlers was: 30 to 40 feet total length, 1 boat; 41 to 50 feet, 22; 51 to 60 feet, 38; over 60 feet, 7 boats.

6. Almost all of the Guayaquil boats are of wooden construction and use brine refrigeration. They all fish with two nets, and many mount their booms on the outboard rails. They make trips of 8 to 12 days' duration. The fishermen head all their shrimp at sea.

7. The Guayaquil Fleet fishes in two widely separated areas. The more important fishing area is the Gulf of Guayaquil, from about Chanduy in the northwest to the Peruvian border. Because the exact location of the frontier is in dispute, and fishermen from both Ecuador and Perú fish in the area under contention, it is possible that conflicts may develop, especially if the shrimp should become scarce. The gulf fishery operates the year around.

8. The other area utilized by the Guayaquil fleet is in the extreme north, within a hundred miles of the Colombian border. The trawlers land the shrimp at the town of Esmeraldas, which is about 80 miles from the border. There are no freezing facilities here, and all the shrimp are shipped to Guayaquil. All of the plants operate fleets of small refrigerated trucks for the long haul. (It is said that these are the only refrigerated trucks in the entire country.) In addition, one plant operates a refrigerated cargo vessel which makes weekly trips to pick up shrimp during the height of the season. Between the Esmeraldas and Gulf fishing grounds there appear to be no worthwhile concentrations of shrimp, and furthermore much of the intervening area seems to be unsuitable for trawling.

9. The second group of boats is the so-called Playas Fleet. It consists of small trawlers based at the resort town of Playas on the north shore of the Gulf of Guayaquil, about fifteen miles northwest of the western mouth of the Guayas River. The fleet was developed a few years after the industry started as an efficient way to harvest the sea bobs and the few very large white shrimps that are found along the nearby beaches. The 57 active boats in 1964 were classified in the following size ranges; under 40 feet total length, 22 boats, 41 to 50 feet, 27; 51 to 60 feet, 7; over 60 feet, 1. These ice boats make trips of only one or two days. The shrimp are landed heads-on. They are shipped by truck the 65 miles to the plants in Guayaquil.

10. The third fleet is based at Esmeraldas. It consists of an indeterminate number of canoes. These fish with cast nets in the lagoons and estuaries for juvenile white shrimp. The shrimp are delivered daily, heads-on, to independent buyers. They are headed ashore, and sold to the company pick-up trucks.

11. Vessel ownership is of two types. The Playas Fleet is mostly privately owned, whereas part of the Guayaquil Fleet consists of company-owned vessels. The largest plant owns 14 boats, and also receives from private boats. Another plant reports receiving half of its shrimp from its own group of 7 vessels and half from private boats. A third company has 5 boats and also receives from 6 private Guayaquil boats as well as from boats in Playas.

12. A few boat captains are Panamanian and Mexican; the remainder are Ecuadorian, many of whom are of Portuguese ancestry. All crewmen are Ecuadorian. All fish on shares. Many of the private boats are owned by families of Portuguese background. These are all commanded by Portuguese. The plant owners all state that these are by far the most efficient vessels and are never involved in any of the dishonest activities of which some boats are accused. As of mid-1966, a group of the Portuguese boat owners, with financial assistance from a relative who operates the largest plant in El Salvador, was planning to build a new freezing plant in Guayaquil. Their boats will be withdrawn from the plants for which they now fish. Accordingly, at least two companies are planning to build five new boats each.

13. Five freezing plants are in operation in Ecuador. Four of these are in and near Guayaquil. The largest and newest plant (four years old) is located four miles down the Guayas River from the city; Empacadora Nacional, C.A., a subsidiary of City Investing Co., of New York, and with American management when visited. The others are on the riverfront in the city.

They are: La Pesquera, S.A., an affiliate of Pacmarine Products Co., of New York; Corporación Pesquera Ecuatoriana, S.A., (COPESA); and Compañía Distribuidora Nacional, S.A., (CODINASA). The last two named are entirely owned by Ecuadorian investors. As noted in the preceding paragraph, another plant is to be built during 1966 with local and Salvadoran capital.

14. The other plant is located at the small town of Posorja at the mouth of the Guayas River (the western channel), about 80 road miles from Guayaquil. It is Pesca Ecuatoriana Santaclenense, owned by Diversified Panamá Investments, a U.S. company based in Panamá.

15. Two of the plants in Guayaquil and the one in Posorja have sorting machines. The largest plant has its own boatyard with marine ways. Being far from town, it has a restaurant for the employees. All plants have refrigerated trucks for hauling shrimp from Playas and Esmeraldas, and one has a carrier vessel.

16. The shrimp industry was developed as an export business. More so than anywhere along the coast, it has remained solely an export enterprise. Practically no market for fresh or frozen shrimp has been developed in Ecuador. This is partly because of the low total purchasing power in the country as opposed to high prices for shrimp. It is also due to a lack of refrigerated transportation and cold storage facilities in the interior. By contrast, the local tuna industry at Manta has been extremely successful in marketing canned tuna in Ecuador, selling a moderately priced imperishable product. Being an export fishery, and with almost all exports going to the United States, the figures on U.S. imports give an accurate picture of the growth and magnitude of the industry. The figures for weights in the following table are heads-off. In 1964 about half the production was heads-off, shell-on.

U.S. IMPORTS OF SHRIMP

FROM ECUADOR

Year	1,000 Pounds	Value, $1,000
1952	41	33
1953	-	-
1954	547	310
1955	1,604	1,074
1956	2,950	2,085
1957	3,867	2,873
1958	4,437	3,122

U.S. IMPORTS OF SHRIMP FROM ECUADOR

CONTINUED

Year	1,000 Pounds	Value $ 1,000
1959	4,712	2,943
1960	4,192	2,793
1961	4,684	2,986
1962	5,121	4,082
1963	5,631	4,374
1964	5,759	4,265
1965	5,665	N.A.

17. The four million dollars that come into Ecuador each year from the export of shrimps is a very great contribution to the economy of this small country and a welcome source of foreign exchange.

18. As elsewhere along the Pacific Coast, the Ecuadorian fishery was originally based on large white shrimp, and these are still the mainstay of the fishery. In 1955 the sizes ran as follows: 20 per cent under 10 to the pound (heads-off weight), 60 per cent 10 to 15, and 20 per cent 16 to 20. The small boats that fish for sea bobs at Playas also catch some exceptionally large whites. The trawlers that fish near Esmeraldas make the same kind of catches, whereas the canoe fishermen take only small whites.

19. In Ecuador, the name camarón is applied loosely to all shrimps in general. In the packing plants the large shrimps of any species are called langostinos, and the sea bobs and small specimens of the white shrimp are called camarones. Almost all of the langostinos are the white shrimps of three species, also called blancos. Of these, Penaeus occidentalis accounts for 60 per cent of the production. Most of the remainder are P. stylirostris, along with some P. vannamei. The whites are taken in 4 to 15 fathoms.

20. The fishery takes very few pinks, or rojos, P. brevirostris, and browns, or cafés, P. californiensis. The fishery scientists believe that a good resource of pinks exists in deeper waters, but there has been little exploratory fishing. The commercial fishery is strictly in shallow water, close to shore, and as yet the fishermen have seen no need to fish offshore. The research vessel of the National Fisheries Institute, while conducting other studies, has made excellent incidental catches of royal red shrimp on an offshore shelf at 400 to 500 meters in depth. This indicates the presence of another potential resource.

21. The small sea bobs are a very important part of the fishery. Two species dominate the shallow water fisheries at Playas and Esmeraldas: the yellow and orange pomada, Protrachypene precipua, and the purplish brown tití, Xiphopeneus riveti. Ecuadorian scientists recognize three species of the striped tigres or zebras: Trachypeneus byrdi, T. faoea, and T. similus pacificus. The tigres spend part of their life histories in the lagoons and estuaries like the whites, whereas the pomadas and titís do not enter estuarine waters.

22. All the plants process langostinos, titís, pomadas, and tigres. Most of the large whites are packed in five-pound waxed cartons, heads-off, shells on, with a glaze added. All the titís, pomadas, tigres, and juvenile or small whites are peeled and deveined. Some of the large whites, particularly those with black spots, are also peeled. The peeled and deveined are of three general types: bulk frozen with the tails left on; bulk frozen without tails; and individually quick frozen (IQF) without tails. The peeled shrimp are packed in five-pound polyethelene bags. Both the bags and the cartons are placed in cardboard master cartons of 30 to 60 pounds for shipping.

23. Some of the plants have machines to sort by sizes, but in the others this is a hand operation. All peeling and deveining is done by hand. Full time plant workers are on salary. The girls who sort, pack, peel, etc., are on a piece work basis. They can earn up to about $1.4 per week, and on good days can make $1.40. After 8 hours of work in any one day, all are paid at time and a half or more.

24. The trawlers catch some spiny lobsters incidentally with the shrimp. They bring in the tails, and those in good condition are frozen for export. The tails are wrapped individually in polyethylene, and packed in cartons. The shrimp plants, and an additional plant that deals only in lobsters, buy whole live lobsters from other fishermen. The tails are frozen raw. The heads are cooked and then frozen for export (to produce picked lobster meat).

25. Almost all the shrimp and lobsters are shipped by refrigerated cargo ship direct to New York. One or two plants have recently begun to ship some by air, via A.P.A., to Miami. The shipping rates are a little over five cents per pound by ship and six cents by air.

26. The plants operate under 10-year licenses. These provide that the plants must take care of the domestic market first, but because local consumption is so low this poses no problems. The packers are granted various tax exemptions for importing equipment and supplies, practically none of which are manufactured locally. In July 1966 the Government enacted a decree that exempted fishing companies from import duties and municipal taxes for the acquisition of fishing equipment. This is for actual fishing, not processing or marketing.

27. There is no direct export tax on shrimp. However, the exporters are required by the Central Bank to exchange their dollars for sucres at an artificial rate which is lower than the free market and results in a de facto tax. Packers and fishermen pay a variety of small port and local taxes and fees.

28. The shrimp fishery appears to be in a healthy condition. It is probably the most stable of all the shrimp industries in the region. Exports have held steady at a point somewhat above five million pounds for five years, with a slight upward trend that appears to be continuing. Shipments to the U.S., during the first eight months of 1966 were 3,621,000 pounds compared to 3,327,000 pounds in the comparable period of the preceding year.

29. It is the general feeling in the industry that present fleet and processing capacity is about right, and that resource utilization is maximum. Some concern has been expressed that the new plant being built, and the extra boats may be a little more capacity than needed. The processing plants are in good condition and are well managed. The fleet is likewise modern and in good condition. The small boat fleet at Playas proves that under certain conditions, small but well operated boats can play a successful part in the shrimp fishery. Boat building and repair facilities are adequate. Shipping facilities are excellent. No complaints are heard that governmental restrictions are burdensome or unreasonable. The fishery should continue at about the same level, with only moderate expansion to be expected.

J. PERU 1/

1. Perú is at the extreme southern edge of the range of the tropical species of shrimps, and consequently has but a small fishery. Most of Perú's very long coastline is bathed by the cold waters of the Humboldt Current. Although this nutrient-rich body of water supports the world's largest fishery - that for the Peruvian anchovy, it is too cold for the Peneid shrimps upon which the Hemisphere's shrimp industry is based. The Humboldt Current moves offshore where it meets tropical waters, near Cabo Blanco. The mixture of different waters at

---

1/ The shrimp fishery of Perú was not visited during the survey of 1965-66. The information in this section was obtained from several sources, particularly from a representative of one of the operating companies, and is current as of November 1966.

the cape results in a fantastic gathering of big game fishes which supports a famous sportfishery.

2. Just north of Cabo Blanco are the fishing towns of Puerto Máncora and Caleta Cruz. The entire shrimp fishery is centered in the 30-mile area from Caleta Cruz to the border with Ecuador. The trawling grounds are actually an extension of the Ecuadorian grounds of the Golfo de Guayaquil. The only Peruvian nursery areas are the estuaries around Puerto Pizarro, and these are not particularly extensive.

3. The shrimp fishery commenced with one boat at the end of 1952. It developed during the next few years as a sideline to the tuna and swordfish freezing industries, mostly to provide employment to the fishermen and plant workers during times when those species were scarce. In 1954 and 1955, four companies were buying shrimp. They operated three floating freezers and one shore plant. The fleet numbered 40 boats, mostly gasoline powered converted swordfish boats of 40 to 45 feet in length. At first they used beam trawls, but soon changed to shrimp otter trawl nets. They usually made two-day trips.

4. The early years saw many fluctuations in production, as the fishery reacted to price changes and the varying abundance of tuna and swordfish. Then as now, the costs of production have been high. There are no harbors, so the fresh shrimp have to be offloaded through the surf, and the processed product must be lightered out to freighters or shipped by truck to the ports of Chimbote or Guayaquil. Consequently only the largest, highest priced, shrimp are handled, and any drop in prices is quickly reflected in diminished production.

5. About 80 per cent of the production is exported to the United States. Hence, the following table, which presents official U.S. import figures, gives a good idea of the magnitude of the industry. Weights are mostly heads-off, shell-on, which is the principal type of product.

U.S. IMPORTS OF SHRIMP FROM PERU

(In 1,000 Pounds)

1952	1	1959	280
1953	352	1960	256
1954	447	1961	358
1955	385	1962	387
1956	250	1963	367
1957	626	1964	308
1958	486	1965	446

6. At the present time, the industry consists of two freezing plants and a fleet of 25 boats. All of the boats are based at the open-sea port of Caleta Cruz. Nineteen are the small 30- to 40- footers, and six are modern 60- footers. The small boats use single otter trawls. The large vessels, which are converted anchovy and tuna boats, use the double rigged Gulf of Mexico style shrimp trawls. All are refrigerated with ice.

7. One small freezing plant (Promarsa) is located in Caleta Cruz. Twelve small trawlers fish for this plant. The other plant (Conulsa), which is an affiliate of a U.S. company whose principal operation in Perú is the manufacture of fish meal, is located in Máncora. Its vessels deliver in Caleta Cruz and their catches are shipped to Máncora by truck.

8. All three species of white shrimp are utilized in the Peruvian fishery. Neither the fishermen nor processors distinguish them, and all are called blancos. Probably Penaeus stylirostris, P. vannamei, and P. occidentalis are about equally distributed in the catches. Only the largest sizes are utilized. About 85 per cent of the pack is "under 15 to the pound" (heads-off), and many of these are "under 10". Fishing is carried on out to a depth of 15 fathoms, but apparently the shrimp are most abundant close to shore in three to six fathoms.

9. The Peruvian fishery, with its limited fishing grounds and even more limited nursery area, can not be expected to expand to very large size. Probably most of the shrimp taken by Peruvian trawlers are migrants from Ecuadorian rearing

grounds. A slight change in water conditions could affect the migrations, as could possible over-fishing in the Golfo de Guayaquil. Furthermore, the high cost of operations precludes the use of small sized shrimp, and especially the sea bobs and tigres which are very important in the nearby Ecuadorian fishery. With the recent addition of the six large trawlers, however, catches should increase moderately. For example, during the first nine months of 1966, U.S. imports were up greatly over the same period of the preceding year - 434 thousand pounds compared to 135 thousand in 1965. Also, during times when prices are exceptionally high, as at present, more of the smaller sized shrimp can be retained and processed.

III. THE SHRIMP FISHERY OF THE CARIBBEAN SEA

A. GENERAL

1. The shrimp export fishery of the Caribbean Sea developed much later than on the Pacific Coast. Cuba started exporting in a small way in 1953, but the fishery never became important. Venezuelan exports commenced in 1957, but were of no real importance until 1961. Export fisheries commenced in both Honduras and Nicaragua in 1958.

2. Unlike the nearly continuous shrimp resource of the Pacific Coast, the shrimps of the Caribbean occur in significant quantities only in restricted areas. Elsewhere they are found in small numbers, sufficient only for small-scale local fisheries.

3. Only three areas appear to have the environmental conditions that are required for the existence of large populations of Peneid shrimps: extensive brackish water lagoons as nursery areas for the juvenile shrimps; and open sea areas with a muddy bottom where the adult shrimps feed and spawn. A relatively level muddy bottom is also necessary for trawling operations.

4. One of the three areas is in the extreme western part of the Caribbean, along a part of the Mexican Coast. It extends from the northern tip of the Yucatan Peninsula at Cabo Catoche southward toward Isla de Cozumel. This extremely limited area is fished by Mexican trawlers based in Ciudad del Carmen and Campeche, by United States vessels based in Florida, and probably by Cuban boats. The limited fishery is of recent origin. No catch statistics are available, and catches made in this small fishery are not included in any of the production figures presented in this report.

5. The second area encompasses the extreme eastern part of mainland Honduras, the offshore islands of Honduras, and the coast and islands of Nicaragua. This area is fished by vessels based in Honduras and Nicaragua, as described in Sections B and C, below. It is also fished by United States trawlers based in Florida. The U. S. vessels, some of which pick up their crews at Honduran and Nicaraguan ports, deliver their catches to their home ports in Florida. Hence, their production is not included in any of the statistics presented in this report. The operation of U.S. trawlers off Honduras and Nicaragua is a recent development. As many as fifty or more may be in the area at any one time. These vessels make a practice of transferring their catches to home-bound boats so they can remain at sea and continue fishing for long periods.

6. The third, and most productive, area is in the extreme western part of Venezuela. The fishery is conducted only in the Lake of Maracaibo and the adjacent Gulf of Venezuela. An enormous fleet of canoes fishes for juvenile shrimps in the lake, and a locally based fleet of trawlers takes the adult shrimp in the gulf.

7. As of 1966, the fisheries in the three areas noted above are being exploited at a rate close to the maximum. Provision of additional shore facilities in Honduras could result in greater production, but further expansion in Nicaragua and in the Maracaibo area is not likely.

8. Elsewhere in the Caribbean, considerable exploratory fishing has failed to disclose substantial shrimp resources, even in areas that appear to meet the ecological requirements of the shrimps. Additional exploration may yet reveal unutilized resources capable of exploitation. Two new development projects of the United Nations Special Fund, one for the islands of the Caribbean and the other for Central America and Panamá, are now underway. Two other projects are in the advanced planning stage; one for Venezuela and one for Colombia. The research and exploratory fishing to be conducted by these projects may well lead to the discovery and development of additional shrimp fisheries.

9. The Caribbean shrimp fisheries are based almost entirely on four species of large Peneid shrimps: the white, Penaeus schmitti; the pink, P. duorarum; the spotted pink, P. brasiliensis; and the brown, P. aztecus. These occur in differing proportions, depending on area, depth and season.

B. HONDURAS 1/

1. The Honduran shrimp fishery commenced in 1958 when United States operators brought in trawlers and established freezing plants. Exports in that year amounted to 836,000 pounds, a figure not to be approached again until 1963. Ever since its inception, the fishery has been extremely unstable, with operations starting and failing in response to a variety of changing conditions.

1/ The survey of the fishery in Honduras was completed in April 1965. Supplemental information was obtained in November 1966 from the owner of one of the freezing plants. The small shrimp fishery of the Pacific Coast of Honduras is mentioned in Section II - D.

2. The Caribbean Coast of Honduras runs east and west for a distance of approximately 365 statute miles. Lying 10 to 30 miles offshore, near the middle of the coastline, are the Bay Islands, consisting of three major islands and numerous small keys. Strung out for many miles east and northeast of the eastern part of the coast are uncounted dozens of small uninhabited keys and reefs which are under the jurisdiction of Honduras.

3. Shrimp are found in quantity only along the 100-mile stretch between Punta Patuca and the Nicaraguan border, and around the keys and reefs that lie offshore. This is the area with suitable trawling bottom and favorable shrimp feeding grounds, and it is adjacent to a series of large lagoons that serve as nursery areas. The 265 miles to the west of Punta Patuca, as well as the Bay Islands, are largely without shrimp. The water is deep, the bottom rough, and the lagoons apparently produce few shrimps.

4. The physical problem faced by anyone attempting to establish a shrimp fishery is that the part of Honduras which is near the shrimp grounds is both uninhabited and inaccessible. All the harbor and service facilities, supplies, and sources of labor are to be found in the towns far to the west, on both the mainland and the Bay Islands. Within reasonable reach of the shrimp grounds there are no towns, harbors, roads, railways, or airfields (except the air strips that the shrimp producers build for themselves). The choice lies between establishing plants in towns far away from the fishing grounds or setting them up in remote and primitive spots lacking all service facilities and amenities. Both approaches have been tried. In either case, costs of operations have been high, which alone has been enough to keep the industry from expanding to the extent that the available resources warrant.

5. Another deterrent to greater development has been the constantly changing official attitude toward the participation of foreign investment, vessels and personnel in the shrimp industry. For example, the boom of 1958 was ended abruptly by the enactment of the Fisheries Law of 1959, which virtually barred foreign participation. It required 51 per cent Honduran capital, which was not forthcoming in view of the otherwise risky nature of the business. Subsequently, the Minister of Natural Resources was given authority to grant temporary permits to foreigners.

6. Since 1959, operations have been partly by Honduran corporations and partly by U.S. enterprises working under temporary permits. From time to time, permits have been cancelled without warning, and boats have been apprehended for fishing without permits when in reality their permits had been withdrawn while they were at sea. Some permits have called for delivering the catches to shore plants; others allow the transfer of catches to carrier vessels, under

supervision, and upon payment of the export taxes. Enforcement of regulations, supervision of plant operations and collection of statistics are all difficult, because the fishery is equally inaccessible to government officials and plant owners (as well as to the reporting officer).

7. In 1959, there were two freezing plants in Honduras, one on Isla Guanaja which is 120 miles west of the nearest shrimp fishing grounds, and the other at Barra Caratasca at the entrance to the most important nursery area and close to the best fishing grounds. A freezer ship that operated out of Puerto Castilla ran aground and sank in 1959. By 1960, a third plant was in operation. Located at Puerto Cortés far to the west of the shrimp grounds, it was primarily a meat packing plant but processed some shrimp. A meat packing plant at Puerto Castilla reportedly has packed some shrimp from time to time.

8. In 1966, three plants were in operation. All were Honduran companies and all involved foreign capital. The original plant at Barra Caratasca, Alimentos Marinos Hondureños, has U.S. investment and management. Although small and somewhat old, this plant has produced consistently for years. A lobster plant commenced operations on Guanaja Island in 1965. Lobsters proved to be less abundant than anticipated, and this plant has turned to shrimp packing. Known as Industria Pesquera Hondureña, the Guanaja plant is owned and operated by a Spaniard who also operates fish canneries in Mexico. Located on Smith Reef, close to Guanaja Island, is Caribbean Producers. This large and modern plant is served by two freezer vessels, which can not only act as supplemental cold storage facilities but as transport vessels. They haul shrimp to Florida for their own company and for the other plants, as well as lobsters and beef for the owner's operations in British Honduras. The Smith Reef plant is an outgrowth of the earlier operations of a shipboard freezing plant.

9. In mid-1965 an American operation was organized to operate on Cayos Hobbies, which is located 75 miles due north of Cabo Gracias a Dios, the easternmost point of Honduras. This enterprise involved a freezer ship. At last reports, Mariscos de Honduras had not gotten into operation.

10. The trawler fleet has varied in size from year to year. In 1959, eight trawlers were actually operating, with several others laid up for repairs. All were diesel powered, and they ranged in size from 30 to 70 feet. In 1960 and 1961, the fleet consisted of nine active trawlers, three fishing for each plant, plus several inactive boats. They ranged in size from 38 to 70 feet, and all but one fished with double-rigged nets.

11. In mid-1964, official permits in force included 7 concessions and 10 provisional permits, not all of which had been exercised. During the period

1960 to 1963, permits of one kind or another had been granted to 52 boats. In July 1964, permits for 12 of the 52 vessels expired (and 10 of these were arrested) and one other had sunk. In September 1964, five boats were licensed, including four that had been arrested during the July mix-up. In early 1965 it was reported that a U.S. company had received permits to operate 60 trawlers in Honduran waters and that these vessels could transport their catches back to the U.S., or transfer them to other vessels for transportation, without landing them in Honduras. Export fees would have to be paid. It was estimated that as of September 1964, approximately 50 vessels were fishing for shrimp off Honduras with some kind of permit. In September 1965, the number had dropped to 30.

12. None of the shrimp vessels operating in Honduran waters was built in Honduras. Most of those fishing for shore plants were built in the United States. Most are of Honduran registry; others still fly the U.S. flag. All 18 that were fishing for shore plants in July 1964 were under Honduran registry. Fifteen of the 30 that were operating under permit in September 1965 were of Honduran registry and 15 were flying the U.S. flag. Of the 14 trawlers fishing for Caribbean Producers in 1966, seven were American and seven were local. Two of the U.S. vessels were modern freezer vessels; all the others used ice for refrigeration.

13. Practically all of the production of the Honduran shrimp fishery is exported to the United States. Hence, the following table, which gives official U.S. import figures, summarizes the growth and magnitude of the industry based in Honduras. It is not as good an indicator of total production as the tables presented in other sections of this report, and is not entirely comparable with them, for the reasons noted in Paragraph 14. The weights in the table are mostly "heads-off, shells-on." Annual catches for the domestic market prior to the development of the export industry in 1958 were estimated at 50,000 pounds. Since then the domestic market has grown very little.

U.S. IMPORTS OF SHRIMP FROM HONDURAS

Year	1,000 Pounds	Value, 1,000 Dollars
1958	836	435
1959	314	118
1960	361	134
1961	227	150
1962	379	259
1963	835	472
1964	698	493
1965	1,632	N.A.

14. The above table shows only the exports from shore plants and freezer ships licensed to operate in Honduras. It does not represent the entire production of shrimp from the waters off the Honduran coast and around the offshore keys. Catches made by U.S. boats fishing offshore and not licensed to fish inside territorial waters are definitely not included. These substantial catches are shown in U.S. production statistics as being produced by the U.S. fishery. The catches made by those U.S. vessels which are licensed to fish inside territorial waters, but which are not required to land their shrimp, are also probably not included. In all likelihood these fail to show as "imports to the U.S.", even though some sort of "export tax" has been paid to Honduran officials.

15. Honduras Government figures on exports in 1963 are very close to the U.S. import figures shown in Paragraph 12: 903,000 pounds with a value of $354,000, F.O.B. In 1963, small amounts were also reported as exported to El Salvador (10,000 pounds) and México (50,000 pounds). Official Mexican customs statistics show no shrimp imports from Honduras. The shrimp were possibly taken home by Mexican trawlers that had been operating out of Puerto Cortés or by boats that stopped over on the way home from Nicaragua, and were thus listed in Mexico as catches made by Mexican boats.

16. The Honduran shrimp fishery is based on two species: the white shrimp, Penaeus schmitti, and the pink shrimp, P. duorarum. In 1959, it was estimated the catches consisted of about equal amounts of the two species, with most of them in the 26 to 30 to the pound size range (heads-off weight).

17. The following information is a summary of the findings of a biologist from the Food and Agriculture Organization who observed the fishery in 1959, 1960 and 1961:

White Shrimp. The fishing grounds are from Punta Patuca to the Nicaraguan border. The whites are taken in less than 20 fathoms. In 1959, two-thirds were taken in depths of 11 to 20 fathoms and one-third in less than 5 fathoms. In 1960, 90 per cent was taken in less than 10 fathoms, the remainder in 16 to 20. The whites are most abundant from August to mid-November. Although the sizes vary from year to year and within a season, they run mostly 21 to 40 to the pound, with none under 15.

Pink Shrimp. The fishing grounds are from 84° (several miles east of Punta Patuca) to the Nicaraguan border. Practically all pinks are taken in depths of 16 to 25 fathoms. (As of 1961, little exploration had been conducted beyond 25 fathoms, and the fishery around the offshore keys had not developed.) Pink shrimp become abundant in late September or October, then gradually decrease after November until March or April, when fishing ends. The sizes run mostly 21 to 40 to the pound, varying from month to month.

Brown Shrimp. Very few browns are taken. They are mostly 26 to 30 to the pound.

As far as is known, there have been few or no governmental incentives to the shrimp industry. The fishery is so remote from the capital that little interest is generated among either investors or officialdom. Foreign capital and management are able to operate by setting up Honduran companies with part local capital. The terms and costs for concessions are not standardized.

Since 1959, the export tax has been 50 cents per gross metric ton, plus 10 per cent ad valorem, established on a basic price of 40 cents per pound. In total, this amounts to a little over four cents a pound. At some places there are unloading charges for the boats. In order to obtain permits, some vessel owners have found it necessary to pay their agents additional fees, which reportedly have run as high as seven cents a pound.

Honduras formerly claimed jurisdiction to a distance of 12 kilometers from shore, but in 1965 this was changed to 12 nautical miles. This includes 12 miles surrounding all the dozens of keys and those reefs above the water, which lie scattered to the north and northeast of the mainland. All of the white shrimp grounds and much of the pink shrimp area are inside the territorial waters as claimed by Honduras.

The Honduras fishery appears to be capable of some expansion. As shown in the table in Paragraph 83, exports increased markedly during the last three years. Preliminary figures for 1966 indicate a continuing growth. Imports into the United States for the first nine months of 1966 amounted to 1, 302,000 pounds, sharply from the corresponding period in 1965 (928,000) and 1964 (399,000).

22. The F.A.O. biologist, writing in 1961, estimated the future of the fishery as follows: "If no restrictions are placed on the size of a fleet it is probable that the fishery would develop into an economically marginal fishery with production almost the same as could be produced by lesser effort..... It is probable that Honduras can produce from one to three million pounds of shrimp tails per year with most of the production occurring from August to January, and that it could support 20 - 30 shrimp boats. These estimates are based on scanty data and should be revised as more data become available." It must be remembered that his estimate was made before the fishery around the offshore keys was developed by vessels based in the United States. It probably is still true that a fleet of no more than 40 boats would be sufficient for the grounds along the mainland and around the nearshore keys.

C. NICARAGUA 1/

1. Nicaragua has a coastline on the Caribbean Sea of about 285 statute miles. The only port where shrimp operations are carried on is Bluefields, which is about 200 miles south of the border with Honduras and 85 miles north of the Costa Rican border. The eastern part of the country, which is referred to as Costa Atlántica, has long been isolated from the rest of the country because of a lack of communications across the jungle and wilderness that lie between the coast and the capital at Managua. Several years ago, regular airline service was provided, that now connects the two parts of the country. Furthermore, during the past two years, an all-weather road has been built eastward from the capital to the head of navigation on the Río Escondido, which empties into the Mar de Las Antillas (Caribbean) at Bluefields.

2. The Caribbean Coast is blessed with an excellent series of large brackish water lagoons and estuaries which provide outstanding nursery areas for young shrimp. Annual rainfall of some 300 inches assures adequate fresh water. Good shrimp feeding grounds, with excellent trawling bottom, are found along almost the entire coast from the mainland beach out to beyond the many offshore keys and islands.

3. A canoe fishery, employing cast nets, has been conducted in the coastal lagoons for many years. In 1956 it was estimated that the canoe catch amounted

---

1/ The survey of the fishery in Nicaragua was completed in May 1965. This date is implied in all references to current operations, unless otherwise noted. Nicaragua is the only country in the survey area with substantial shrimp fisheries on both the Caribbean and Pacific coasts. For a description of the Pacific fishery, see Section II-E.

to about 100,000 pounds a year. With frequent air service to Managua and a growing market for fresh shrimp in the capital, it is likely that the lagoon catch is much greater now. No statistics are available.

4. The export fishery commenced in 1958, when a French company received a concession to produce frozen shrimp for export to the United States. This company, known as Casacruz, built a freezing plant, docks and houses, a miniature village in fact, alongside the existing village of El Bluff on the island of the same name at the entrance to Bahía Bluefield. The bay provided shelter for the fleet of trawlers that was brought in from Panamá and the United States. El Bluff is a port of entry, and the shrimp could be sent by refrigerated ship to the U.S. or to Panamá where they could be re-shipped. It soon became obvious to the Nicaraguan investors that the management was not up to running a plant in a remote and difficult place, and the company went into receivership. In 1962 it was being managed by officers of the Banco Nicaraguense. At that time it had 14 trawlers fishing for it.

5. Subsequently, the plant was taken over by a subsidiary of a U.S. company and was completely rebuilt, to become one of the most modern and best operated shrimp plants to be found anywhere. Booth Fisheries de Nicaragua, S.A., with U.S. capital and management, is partly owned by the National Institute of Development (INFONAC) which is a governmental company.

6. Another plant in the Bluefields area started operations a few years ago. Pescanica, S.A., is on an island in the bay, Schooner Key. Managed by a Cuban, this company is owned partly by Atalanta Trading Company of New York. Well known Nicaraguan families own a large share.

7. These two companies have the only concessions granted by the Government. Exclusive concessions are granted only to companies that are owned partly by Nicaraguans and that can actually demonstrate that they are physically and financially able to operate. Furthermore, no trawlers may fish except for delivery to the concessionaires. In as much as the two plants are capable of handling the entire production of the fishing grounds, no additional concessions are likely to be issued. The plant operators may import boats, machinery, parts, equipment, and supplies duty free.

8. Unlike freezing plants elsewhere, neither Booth nor Pescanica own any boats. They contract with U.S. and Mexican trawlers to fish for them. As the fishery is seasonal, the boats come and go, and the size of the fleet is not constant. During the best fishing season, Booth may have over 40 boats and Pescanica over 20. The boats, all double-rigged and all ice refrigerated, are a miscellany of Gulf of Mexico types - wooden and steel, old and new. They fly their own flags, although some for convenience fly the Nicaraguan flag unofficially. They are

free to transfer to Nicaraguan registry if desired. Some are so old that they will never see their home ports again, but some of the newer ones "commute" regularly every year. Captains are U.S. or Mexican, as the case may be. Crews are Nicaraguan and Honduran. (The Bay Islands of Honduras, where the people are English-speaking, as are many in Bluefields, produce some of the best fishermen and seamen in the world.) The boats obtain their ice and other supplies from the plants. Fuel oil is available, but boatyard facilities are minimal. Compared to the modern, standardized fleets of El Salvador, Guatemala or the Guianas, the Bluefields craft are a motley group with formidable maintenance problems, but they operate efficiently.

9. A fleet of over a hundred canoes operates inside Bahía Bluefield. They sell their catches to independent buyers in Bluefields. These sell the larger sized, prime quality, shrimps to the freezing plants to augment the trawler catches. The smaller shrimps are sold locally or shipped to Managua.

10. Two small companies dry shrimps for export. One is Kai Yun Chan, located on Laguna de Perlas, which is a few miles north of Bluefields. The other is Ernesto Hooker, on Río Huahua, which is near Puerto Cabezas on the North Coast. They buy the catches of canoe fishermen who fish with cast nets in the nearby lagoons and estuaries.

11. The growth and magnitude of the Nicaraguan shrimp fishery are reflected in the official U.S. import figures, in as much as practically all of the production is exported to the U.S. The following table shows <u>all</u> imports from the fisheries on both the Caribbean and Pacific coasts. (This table is exactly the same as the one in Paragraph 6 of Section II-E, the description of the Nicaraguan Pacific Coast fishery.) Most of the weights shown in the table are for heads-off, shells-on shrimp. However, an increasing proportion is shipped peeled and deveined, and a significant amount of the exports consists of dried shrimp.

<u>IMPORTS OF SHRIMP FROM NICARAGUA (BOTH COASTS) TO THE UNITED STATES</u>

(In 1,000 Pounds)

1953	3	1960	266
1954	1	1961	803
1955	8	1962	1,971
1956	0	1963	1,611
1957	1	1964	2,520
1958	278	1965	3,155
1959	213		

12. The small shipments made during the period 1953 through 1957, as noted above, were in all likelihood dried shrimp from the Caribbean Coast. In 1964 (the only year for which figures are available on type of product), the U.S. imported 91,000 pounds of dried shrimp from Nicaragua. This is far more than from any other country in the area covered by this report.

13. The shipments made during the period 1958 through 1960, and most of those in 1961, were from the Caribbean fishery, as the Pacific fishery did not commence until September 1961. The figures for later years include the production from both coasts.

14. A breakdown of production on the two coasts for the period 1962-1964 was obtained from the Director of Natural Resources, Nicaraguan Ministry of Economy, which showed that in 1964, the Caribbean Coast produced about two - thirds of the nation's shrimp exports. The Government's export figures are considerably higher than the United States import figures. However, they indicate the relative production of the two coasts. They are as follows (in 1,000 pounds):

	Caribbean Coast	Total	% Caribbean
1962	1,195	2,787	42.8
1963	1,187	2,273	52.3
1964	2,314	3,543	65.3

15. The figures given in the preceding paragraphs do not include the catches made off the Nicaraguan coast by U.S. vessels which are based in Florida and which carry their catches back to their home ports. As many as 30 U.S. trawlers may be fishing offshore during the height of the season. They take turns carrying each others' catches home, transferring the shrimps at sea. Some of these vessels are equipped with freezing equipment; others have brine refrigera Formerly, some of the U.S. boats purchased shrimps at times from the boats licensed to fish for the shore plants near Bluefields, by offering higher price As the sale of shrimps at sea was a violation of Nicaraguan law, the practice was forcibly ended in 1965. The transferred shrimp are not included in the figures presented in this report. All shrimp taken to Florida by U.S. fishing vessels are included only in statistics that give the landings of the U.S. flee

16. Of the four species taken by the freezing plants, the two varieties of pink shrimps are by far the most important. The pink, Penaeus duorarum, and the spotted pink, P. brasiliensis, are taken together in approximately equal proportions. They are not separated in the plants. The most numerous size ran is 21 to 25 to the pound (heads-off, shells-on).

17. Both of the pinks are offshore species, occurring around the keys and islands. They are usually fished at depths of about 25 fathoms. The pinks usually appear in October and continue into the following May. The best grounds lie within the triangle formed roughly by Punta de Perlas (Pearl Point), Islas del Maíz (Corn Islands) and Punta del Mono (Monkey Point, also called Punta Mico). The points of this triangle are the following approximate distances and directions from El Bluff; Pearl Point is 30 miles north; Monkey Point is 30 miles south; and the Corn Islands are 50 miles northeast. The slowest season for all species is from mid-May through July, and during this period most of the fishing is to the south of El Bluff.

18. The white shrimp, Penaeus schmitti, is important seasonally. The adult whites seem to leave the lagoons for the ocean when the heavy rains begin in June. They are fished from August through December. The fishing grounds are entirely separate from those for the pinks. They extend from near the Honduran border at Cabo Gracias a Dios, past Puerto Cabezas to Prinzapolca, a distance of about 130 miles. From Prinzapolca to El Bluff is a run of 95 miles. The whites, which are fished only in the daytime, occur in very shallow water. Sometimes the trawlers operate just outside the breaker line in 1 1/2 to 2 fathoms. Occasionally the whites are so close to the beach, and in such great quantities, that the local residents can catch them in sacks, screens and buckets.

19. Although not very important to the fishery, some brown shrimp, Penaeus aztecus, are taken in the same area and season as the whites. They are caught a little farther from shore, and are fished during the night.

20. The freezing plants do not use the sea bob or titi, Xiphopeneus kroyeri, although this species is abundant. The canoe fishery in the lagoons, which takes shrimps for drying and for the local market, utilizes both the titi and the sub-adult white shrimp, along with some larger whites.

21. The two freezing plants are modern and well equipped. Both the pinks and the whites, although too small to compete for the same market with the giant (or so-called jumbo) whites of the Pacific Coast, are the right size for marketing as peeled and deveined. Hence, an extremely large proportion of the pack is in the form of peeled and individually quick frozen (I.Q.F.) or butterfly (peeled and deveined, split open, with tail attached). For these packs, the peeled shrimps are placed individually on metal trays for freezing.

22. All frozen shrimps are shipped to the United States by refrigerated ships, mostly in the standard five-pound cartons and master cartons.

23. The shrimp trawlers catch considerable quantities of spiny lobsters in their

nets. Both freezing plants handle these incidental catches for the export market. Booth Fisheries also ships frozen fillets from trawler-caught fish. When the lobsters are running south of Bluefields, toward the Costa Rican border, some of the trawlers work their way in that direction even if shrimp catches are light.

24. Around the Corn Islands there is a canoe fishery for lobsters. The Bluefields plants buy some lobsters from the islanders to supplement their trawl catches. Two plants on the islands also export lobsters: E. Sabellos M., a Nicaraguan; and Bowers, Inc., an American. The Ministry of Economy reports the following amounts of lobsters exported to the United States from Corn Island and Bluefields: 1962 - 330,000 pounds; 1963 - 526,000 pounds; and 1964 - 241,000 pounds. These figures represent lobster tails.

25. Until 1965, Nicaragua's claims to territorial waters and fishing zones were somewhat unclear. Enforcement officials tended to consider the fisheries zone to extend offshore to the 200-meter depth contour. In April 1965, following the appearance of numerous U.S. shrimp trawlers around the Caribbean islands, the Nicaraguan Government proclaimed fisheries jurisdiction to a distance of 200 nautical miles from land. On the Pacific Coast, where shrimps are close to the mainland and there are no islands, the new limit makes little difference to foreign fishermen, who were already excluded. However, off the island - studded Caribbean Coast with its broad shallow areas, the new limit extends a very great distance offshore and includes all shrimp grounds. Additionally there is a 25-mile "conservation zone" around the Corn Islands, where only the islanders may fish in their canoes, and where even the licensed Bluefields trawlers are excluded.

26. The export tax on all shrimp, regardless of species or size, is three cents a pound.

27. It is probable that the existing plants can produce up to three million pounds of pink, white and brown shrimp annually. If and when the titís are exploited for the overseas market, the Caribbean fishery can probably expand considerably.

D. VENEZUELA 1/

1. Venezuela's modern shrimp fishery commenced about 1959, in the vicinity of

---

1/ The survey of the fishery in Venezuela was made in July 1965. This date is implied in all references to current operations, unless otherwise noted.

Maracaibo. Large scale exports started in 1961. After a preliminary shakedown, the industry underwent a meteoric expansion, the like of which had never been seen anywhere. With a smaller fishing area than most countries, the Venezuelan fishery by 1965 was producing more shrimp than any other fishery south of México. The explanation of the enormous catches (about 16 million pounds in 1965) lies in the tremendous productivity of Lago de Maracaibo, which is probably the greatest single nursery area for white shrimp in the Americas.

2. Venezuela has a coastline of 1,750 statute miles, including gulfs and islands, over three-fourths of which is on the Caribbean Sea proper and the remainder on the Atlantic Ocean. As noted below, shrimp have been encountered in commercial quantities only in the extreme western part of this long coastline. To all intents and purposes, the shrimp fishery is confined to the Golfo de Venezuela and its tributary, Lago de Maracaibo, which are very close to the Colombian border.

3. The large-scale shrimp fishery of the Maracaibo area commenced almost accidentally. In 1954, a group of Italian trawl fishermen moved a fleet of trawlers from other ports to Punto Fijo on the Gulf of Venezuela. They originally fished primarily for fin fish for the fresh fish markets of Caracas and Maracaibo. They soon found that they could sell the shrimp that were taken incidentally with the fish. Soon, shrimp for the domestic market became a primary source of income to the fleet at Punto Fijo.

4. The next logical step was to export surplus shrimp catches to the expanding market in the United States. The first small shipments were made in 1957. During the next three years, the export industry grew slowly, but in 1961 it sprang into prominence following the construction of many freezing plants. The people of the area realized that a veritable bonanza existed at their doorstep, and they reacted by indulging in the kind of over-expansion that has characterized other shrimp fisheries. In spite of various setbacks, the industry grew rapidly. By 1965, Venezuela was producing more shrimp than any country in the Western Hemisphere except the United States and México. This tremendous production, concentrated in one very small area, compares favorably with the catch of other grounds of similar size elsewhere in the world.

5. The growth of the fishery is shown in the following table, which depicts catches made in the Western Zone (Golfo de Venezuela, Lago de Maracaibo, and connecting waters), and for the entire country. The table indicates the overwhelming dependence of the Venezuelan fishery on one small area.

PRODUCTION OF SHRIMP IN VENEZUELA

(In 1,000 pounds) ±/

Year	Western Zone	Remainder of Country	Total
1958	2,273	213	2,486
1959	3,347	262	3,609
1960	2,480	635	3,115
1961	5,260	229	5,489
1962	8,256	179	8,435
1963	8,472	126	8,598
1964	9,370	174	9,544
1965	15,966	522	16,488

±/ Weights are mostly in heads-off equivalents, although shrimp for the domestic market are probably recorded as heads-on.

SOURCE: Sección de Estadística, Ministerio de Agricultura y Cría.

6. The foregoing table represents catches made for both the domestic and export markets. Although catches for domestic consumption have remained important and have probably grown steadily, it has been the expansion of the export industry that has accounted for the truly phenomenal growth of the Venezuelan shrimp fishery. In as much as the United States is by far the largest purchaser of Venezuelan shrimp, the growth of the fishery is best presented in the following table, which gives official U.S. import figures. For a comparison with imports from other countries, the similar tables in other sections of this report may be consulted. The weights shown are mostly heads-off, shells-on, with some peele and deveined. Prior to 1957, the only imports recorded from Venezuela were 16,000 pounds in 1952.

U.S. IMPORTS OF SHRIMP FROM VENEZUELA

Year	Weight 1,000 Pounds	Value, 1,000 Dollars
1957	137	98
1958	122	78
1959	370	243
1960	344	149
1961	2,469	1,115
1962	6,341	4,067
1963	5,790	3,344
1964	7,904	4,457
1965	12,719	N.A.

7. Small quantities of frozen and canned shrimp are exported to other countries. Official Venezuelan sources list total shrimp exports, by country, for the period 1962-1964, as follows:

EXPORTS OF SHRIMP FROM VENEZUELA, BY COUNTRY

(In 1,000 Pounds)

Destination	1962	1963	1964
United States	7,866	7,338	9,227
Spain	-	50	170
Aruba, Curacao, Surinam	7	15	9
Belgium, Luxembourg	-	15	-
Italy	-	12	-
Netherlands	-	8	-
Puerto Rico	2	-	-
Total	7,875	7,438	9,406

8. No description of the remarkable Venezuelan shrimp fishery can be given without first considering the equally remarkable distribution of shrimp, which is concentrated in the extreme west, as noted above.

9. Practically all of the coastal areas where shrimps might be expected to occur have been explored without significant results, except for the Maracaibo area. During the 1950's and early 1960's, the U.S. exploratory fishing vessel OREGON made several cruises along the Venezuelan coasts. Contrary to the results obtained off the coasts of the Guianas and Brazil, which resulted in the development of a sensational new fishery (See Section IV), the OREGON found little of interest off Venezuela.

10. During the period 1962-1964, the La Salle Foundation, with the financial support of the Venezuelan Government, surveyed the Atlantic Coast off the delta of the Río Orinoco. The Florida-style trawler NEREID fished at all depths and all seasons, but encountered no commercial quantities of shrimps. Considerable amounts of sea bobs, Xiphopenaeus kroyeri, were taken, but not enough to be encouraging.

11. The American owner of the NEREID informed the reporting officer that he has personally explored the Caribbean Coast and the Golfo de París, wherever the type of bottom and the proximity of lagoons indicated that shrimp should be abundant. However, he found no quantities of shrimp to the east of the Maracaibo area. Scattered white shrimp were taken occasionally, and small sized sea bobs were found in abundance along the middle part of the Caribbean Coast. The París area has all the attributes of good shrimp fishing, and additional exploratory work should eventually lead to the development of a fishery. Improvement of the new fishing port at Güiria may also result in more efforts at locating shrimp grounds in the Gulf of París. Fishermen from Trinidad now take shrimp along their own coast on the eastern edge of the gulf (See Section IV-C).

12. At present, small scattered local fisheries exist along the entire coast. Probably, most of the production listed as "remainder of country" in the table in Paragraph 5 comes from Isla Margarita, which lies off the eastern part of the Caribbean Coast. The Margarita fishery is supported by the spotted pink shrimp. The several local fisheries of the coastal bays and lagoons are based on the capture of juvenile white shrimp.

13. Maracaibo Lake and its distributary system of waterways constitute an almost perfect environment for the production of shrimp. They contain excellent feeding spawning and nursery areas, apparently in the right proportions. Every necessary degree of salinity is present, along with water temperatures that are conducive to year-around spawning and growth. Furthermore, the harvest of shrimps is made

possible by the existence of suitable fishing grounds for several types of gear. If someone had been commissioned to design a model shrimp area, he could not have improved upon the Maracaibo complex as it exists today.

14. The heart of the area is the Lago de Maracaibo itself. The lake covers an area of approximately 5,500 square miles, and is the largest lake in South America. Its watershed totals about 35,000 square miles, much of it mountainous and with heavy rainfall. Most of the lake is shallow, but a maximum depth of 115 feet is reached in the southeast portion. The waters of the lake are a mixture of fresh water from the outflow of many rivers and sea water entering from the mouth of the lake. Until 1958 the salt content had fluctuated around one part of sea water to 25 parts of fresh water, but recently chlorinity has risen to more than double the former amount. This has been due to the construction of a deep-water channel to permit the passage of oil tankers to and from the petroleum installations that ring the lake. A counter-clockwise circulation, driven by the wind, brings sea water to the surface in the middle of the lake and provides for a uniform surface chlorinity throughout. The shore areas of the lake, particularly the northwestern and northeastern portions, are splendid nursery areas for white shrimp. Temperatures in the lake range from 28 to 31 degrees Centigrade.

15. The lake drains into the small, shallow Bahía de Tablazo through the Estrecho de Maracaibo, on the west shore of which lies the city of Maracaibo. The bay is a typical transition zone, abounding in mangrove habitat, with hydrographic conditions changing seasonally. Both the bay and the straits are excellent nursery areas for juvenile white shrimp.

16. The bay empties into the Golfo de Venezuela through a series of channels, one of which has been dredged for the passage of tankers. The gulf covers an area of approximately 6,500 square miles. It is protected from the open waters of the Caribbean by the Península de Paraguaná on the east and the Península de la Guajira on the west. (The outer extremity of the latter peninsula is in Colombia). The gulf is subdivided into two parts, the gulf proper on the east, and the Ensenada de Calabozo in the west, lying south of the Península de la Guajira. A shallow ridge, running north and south, divides the two parts. Calabozo has a maximum depth of 15 fathoms, whereas the outer gulf ranges down to 44 fathoms at its mouth. As could be expected from the depth pattern, white shrimp are found in Calabozo, and browns and pinks are taken in the open gulf. Surface water temperatures vary seasonally from 25 to 28 degrees Centigrade.

17. Completing the environmental complex is a small protected gulf, the Golfete de Coro, which is an indentation of the main gulf on the east, completely

protected by the Península de Paraguaná. This shallow bay, along with the nearby shores of the gulf itself, is the principal nursery area for juvenile brown and pink shrimps.

18. The various types of fishing that have developed have been designed to take advantage of the life histories of the several species of shrimps that occur in the area. The life histories, although imperfectly known, are the subject of current study by the Instituto Venezolano de Investigaciones Científicas. They are summarized in the following paragraphs. Because the fishery is so new and changing rapidly, the relative importance of the various species of shrimps is not known with certainty.

19. Nine species of shrimps are found in the Maracaibo area. Seven are Peneid species, of which four are important commercially. The two Caridean species are of minor importance. In general terminology, the local fishermen refer to all large shrimps, regardless of species, as langostinos. The smaller individuals are called camarones, and the smallest are camaroncitos.

20. By far the most important species is the white shrimp, Penaeus schmitti. Known as langostino blanco or camarón blanco, this species may account for as much as three-fourths of the total production. Apparently the whites spawn throughout the year on their principal feeding grounds in the Ensenada de Calabozo. The post-larvae apparently migrate to the nursery areas of the Bahía de Tablazo and the adjacent shores of the open gulf, the straits, and the lake itself. As sub-adults they return to Calabozo where they later enter the fishery as the predominant species. As adult shrimp, the whites constitute approximately 50 per cent of the total catch made in the Golfo de Venezuela. In the fishery in the Lago de Maracaibo, the juvenile whites account for 90 per cent or more of the catch, depending on the place and season.

21. Three other species of Peneid shrimps inhabit the eastern or open, deep water part of the Golfo de Venezuela. Most important of these is the pink shrimp, Penaeus duorarum, which is known as camarón rosado. This species constitutes 50 to 75 per cent of the catches made in the outer part of the Golfo de Venezuela. The spotted pink shrimp, P. brasiliensis, is found mostly just outside the gulf proper, north of Cabo San Ramón. Because little fishing has been done in this area yet, its true abundance is not known. This species is known locally as camarón rosado con mancha. The third species is the brown shrimp, P. aztecus, known locally by the specific name of camarón marrón. The brown shrimp contributes about 20 per cent of the catches made in the outer gulf. The fishermen group all three species together and give them the general name of camarón marrón. (Scientists also group them for convenience and call them grooved shrimps, as distinct from the whites.) Some of the plants pack them all indiscriminately as browns, some separate them as pinks or browns, depending on

color (which is variable). The nursery grounds for all three species are in the Golfete de Coro, where a small fishery exists, and along the nearby shores of the main gulf. At times, these species appear in the catches in Lago de Maracaibo in appreciable quantities, so this area is probably a fairly important nursery area for them also. Because of the confusion of local nomenclature, and because of the difficulty of accurate identification of the younger stages, which are quite similar, it is difficult to say precisely what proportion of the catch in the lake is composed of the various species of grooved shrimps. However, it has been estimated that P. aztecus accounts for nearly 10 per cent of the total lake catch.

22. Completing the list of Peneid shrimps are the sea bobs, Xiphopenaeus kroyeri and Trachypenaeus similis, and a rock shrimp, which has been identified tentatively as Sicyonia stimpsoni. The latter two are of no commercial importance. X. kroyeri is taken in small quantities in the Calabozo fishery. Known as the siete barbas, it is also called camarón blanco, and the larger individuals are marketed along with the true whites. It does not appear to be very abundant.

23. The two Caridean shrimps are found in the lake, particularly in the more southerly parts which are influenced by the many rivers. Macrobrachium acanthurus, or brazo largo, is of little commercial importance. However, M. amazonicum, or camaroncito de río, often enters the catches in considerable quantities. It sometimes constitutes as much as 15 per cent of the catches in the lake. Also known as camaroncito blanco, it is marketed along with the juvenile whites. In fact, the lake fishermen remain convinced that it is the same species. Because they often catch M. amazonicum in the egg-bearing stage, they believe that the spawning grounds of the white shrimp are in the southern part of the lake. The government biologists have tried in vain to explain that the true white shrimp (like all Peneid species) is a free spawner and does not carry its eggs attached to its swimmerets.

24. The Maracaibo shrimp fishery really consists of several types of fisheries. Two different trawl fleets operate in the Golfo de Venezuela. Three kinds of canoe fisheries are conducted along the shores of the gulf, in the Golfete de Coro, Bahía de Tablazo, the Estrecho de Maracaibo, and particularly in the Lago de Maracaibo. It has been estimated that the trawl fisheries of the gulf account for two-thirds of the total production, and the canoe fisheries are responsible for the remainder.

25. The larger of the two trawl fleets, and the first to be established, is the one based at Punto Fijo on the Península de Paraguaná. This fleet started operating in 1954, when a group of Italian fishermen brought their trawlers to Punto Fijo to engage in a general fresh market fishery. Traditionally, the

fisheries of eastern and central Venezuela have been conducted by fishermen of Italian ancestry, and the move to the Golfo de Venezuela was a natural outgrowth of the general expansion of the fisheries.

26. The Italian boats range from 39 to 85 feet in length, and carry crews of 5 to 11 men. Some were constructed in Italy, but most were built in Puerto Cabello whence many of the fishermen came. Because they were intended originally to fish for bottom fish, they used the typical otter trawl or balloon trawl. These large nets, fished singly over the stern, are effective for fin fish and take quantities of shrimp incidentally. As the shrimp became relatively more important with the development of the export market, the Punto Fijo fleet began to spend more of its time fishing for shrimp, but never to the exclusion of fin fish. After observing the superior shrimp catching ability of the new fleet that began using Gulf of Mexico style shrimp trawls in 1964, the Italian fleet began changing to the new gear. In early 1965, about half of the fleet had converted, and by the end of the year all but five or six boats were using the double rigged Gulf nets. However, none of the Italian captains have started to use the try net.

27. By 1964, the Punto Fijo fleet numbered 42 vessels. By the end of 1965, the fleet had increased to 55 trawlers, with numerous additional boats planned. The Italian trawlers make trips of five to eight days. They fish mostly in the eastern part of the gulf and around the entrance. The brown and pink shrimp are taken at night, at 35 to 40 fathoms. These vessels also fish to the westward for white shrimp. The catches are landed at Punto Fijo. The fin fish are shipped to Caracas and Maracaibo by refrigerated truck. Several thousand pounds of shrimp are also trucked daily to Caracas. The domestic market prefers its shrimp heads-on, and pays premium prices for the highest quality catches. The bulk of the shrimp are sent by truck to the freezing plants in Maracaibo. Most plants have weekly deliveries.

28. In 1964, shrimp accounted for only about a fourth (26 per cent) of the tonnage taken by the trawl fleet at Punto Fijo, but they provided somewhat over half (52 per cent) of the fleet's income. Statistics of the Ministry of Agriculture show the following catches and values for the Italian-style fleet in 1964:

PUNTO FIJO CATCHES, 1964

Variety	Weight, 1,000 Pounds	Value, $1,000
Shrimp	4,190	625
Fin Fish	10,668	439
Squid	1,120	135
Total	15,978	1,199

29. The refrigeration system aboard the Punto Fijo boats is inadequate to say the least. The traditional container for both fish and shrimps is a flat wooden box that holds 10 kilos (22 pounds) of shrimp, plus a few ounces of ice. These boxes are kept in the hold with a little additional ice for up to 8 days, before the 4-hour trip to the freezing plant in a truck that also contains only a small amount of ice. The boxes are seldom cleaned.

30. For a variety of reasons, the Punto Fijo shrimp are virtually all landed and delivered to the plants heads-on. For one thing, the fishermen are so busy sorting and boxing various kinds of fish that they won't bother heading shrimp. The health inspector at Punto Fijo enforces an ancient rule that all fish must be delivered heads-on. Enacted long before the shrimp fishery developed, the law was intended to let the prospective buyer judge the freshness of the fish by the appearance of the eyes. Furthermore, the plant workers enjoy the extra income derived from heading and resist all efforts to change. All observers have recommended an improvement of this situation, but neither the fishermen nor processors have taken any corrective steps.

31. The second trawl fleet, which is based in Maracaibo, had its inception in 1964 with the arrival of 11 Florida-style vessels from the United States. By the end of 1965, the Maracaibo fleet numbered 14 trawlers. These are mostly 62 to 65 feet long, with a few larger ones, and are of wooden construction. (An additional 7 vessels from Florida are included in the fleet of 55 based at Punto Fijo). These vessels use the double rigged Gulf trawl, with one net fished from each side. The nets are mostly 40 feet across the opening or somewhat more. All vessels first locate the shrimp with try nets.

32. The Maracaibo vessels make trips of up to 5 or 6 days. They fish mostly in the Ensenada de Calabozo where white shrimp predominate. They fish in the daytime, in depths up to 15 fathoms. Each boat carries a captain and five crewmen. Catches are landed at Maracaibo, for trucking to the freezing plants in and around the city, none of which is located where direct delivery is possible.

33. Some of the U.S.-style trawlers still use the traditional 10-kilogram boxes, but most have holds equipped with ice bins. Sufficient ice is carried. Aboard the Maracaibo fleet, most of the shrimp are headed upon being caught, especially those taken during the first three days of a trip.

34. Although foreign-flag vessels are theoretically permitted to fish, registration under the Venezuelan flag is considered essential for effective operation. Actually, all vessels are registered as Venezuelan. All captains and crew members are Venezuelan. Some boats carry "technical advisers," who are Italian or American, depending on the vessel. Practically speaking, the numerous local fishermen, who are extremely vociferous, are opposed to the presence of any

foreign fishermen. They have also blocked any participation of foreign investment in the freezing plants. All of the vessels in both fleets are owned independently. A freezing plant that has since ceased operations owned several of the Florida-style vessels, but these now fish independently. The owners negotiate their own contracts with the freezing plants.

35. When the first trawl fishermen arrived at Punto Fijo, they were greeted with a cold reception by the numerous local canoe fishermen. Expressing the fear that the trawlers would deplete the resources, but actually dreading the competition on the market of the more efficient gear, the canoe fishermen succeeded in having enacted various restrictions. At first, the entire area was off limits, but finally parts of the gulf were opened to trawling. At present, all trawling is prohibited in the lake and its connecting waterways, and in the Golfo de Venezuela south of a line drawn from Punta Adaro (near Punto Fijo) across to Boca Paijama. Elsewhere in the gulf, trawling is prohibited within 8 miles of shore. These restrictions deny to the trawlers about one-fourth of the productive white shrimp area and three-fourths of the area for browns and pinks.

36. In anticipation of a proposed relaxation in the laws, which would permit the operation of small trawlers in the outer four miles of the closed area, most of the 13 trawlers added to the two fleets during 1966 are under 50 feet in length. On occasion, special permission is granted for limited trawling in closed areas in an attempt to assess the extent of the resources, but every such permit is opposed bitterly by the canoe fishermen.

37. To protect small shrimp, minimum mesh sizes are required in trawl nets. The opening must be 3 centimeters in the bag and 5 centimeters in the remainder of the net. All trawlers must have renewable permits, which may be revoked for violation of the fishing laws.

38. In August 1965, approximately 3,200 canoe fishermen were engaged in the shrimp fishery in the Maracaibo area. They operated 636 small boats. During periods of exceptionally good shrimping, other fishermen join them, so that at times over 4,000 men are taking shrimp. The canoe fishermen use three types of gear, as described in the following paragraphs.

39. The most important of the small boat fisheries is that employing a narrow boat of up to 25 feet in length, called a chalana, which is powered with an outboard motor of 35 to 40 horsepower. The net is a form of beach seine, called a mandinga, which is 100 to 150 meters in length. The net is worked in chest-deep water, with three men "walking" the net, and two men remaining in the boat to haul net and shrimp aboard. The mandinga is used principally in the northwest and northeast portions of the lake, and also in Bahía de Tablazo. In 1964 it was estimated that 2,000 fishermen operated 400 chalanas.

40. Another type of beach seine is the copito, which is only 15 to 20 feet in length. It is operated by a crew of 2 or 3 men from a small canoe, called cayuco, which is usually without a motor. This net is used principally in the southern part of the lake.

41. The third kind of gear is the cast or throw net, which is known as the atarraya. It is the least efficient of all, and is used only where the beach seines are not able to operate because of obstructions. The atarraya is used principally along the southeastern coast of the lake, and in the lagoons and mangrove areas at Isla San Carlos and Río Limón, which are on the Bahía de Tablazo.

42. The lake fishermen generally start their day's work at 3:00 a.m. They deliver their catches daily to the pick up trucks from the freezing plants at five landing points on the west side and two on the east side of the lake. The shrimp are taken to the plants heads-on. Most of the lake shrimp are processed on the day of capture, and hence are in excellent condition when frozen. Some 2,000 pounds of lake shrimp are shipped daily to the market in Caracas. These always bring a higher price than those destined for the freezers. At times, the small boat fishermen make excellent catches: a good mandinga crew can take as much as a ton in a morning's fishing.

43. Like the trawlers, the small boats are owned and operated independently. Until recently, the various plants bid against each other for every load of shrimp. When shrimp are scarce, the bidding can become highly competitive. Lately, the plants have contracted with groups of small boats and have worked out arrangements whereby they advance financing for fishing gear and take repayment in shrimp. Each plant has a group of 50 to 80 canoes, plus an indeterminate number of independent craft.

44. During 1965, the plants paid the following prices for shrimp. Lake shrimp, which when headed run 36 to 100 per pound, cost $0.10 to $0.28 per pound, heads-on weight. Gulf shrimp, which when headed run from under 10 to 35 to the pound, cost approximately $0.38 a pound heads-on, and $0.62 per pound heads-off. The transportation charge from Punto Fijo adds $0.02 per pound. The above prices are based on a flat rate for mixed sizes, and vary on a rough estimate of the proportion of sizes. One plant and its associated fleet of trawlers work on a basis of how the catches pack out by size groups, which is more or less the procedure in other countries.

45. Processing of frozen shrimp for export commenced in a big way in 1961. The first small plants were in the outskirts of Maracaibo, and many used municipal cold storage facilities for lack of proper equipment. Almost overnight, new plants sprang up like mushrooms. By early 1962, there were 27 small freezers, far more than the industry could support. All the companies were small and few had capital reserves to weather the caprices of the international market or the

vagaries of a seasonal fishery. Fewer still had experience in processing or marketing a perishable product, and not many had the benefit of advice and guidance from buyers, that come only from close contacts. No one seemed to heed the lessons learned in other countries when the fisheries were developing.

46. Because of the above difficulties, plus the frequent rejections by U.S. health authorities of poor quality products, most of the plants soon failed. By then, the Venezuelan industry had acquired a poor name abroad. By early 1963, only half a dozen companies were still in operation. As of July 1965, there were seven plants, and by that December ten were in operation. The operators who survived were those who early recognized the importance of proper equipment and careful use thereof, quality production, and orderly marketing through good contacts in the United States. Although all the plants are locally owned, much of their U.S.-built equipment and machinery is financed by the buyers in the U.S.

47. The seven plants that were in operation during the height of the industry's productivity in July 1965 were adequate to handle all the shrimp that the fishery could produce. However, during the latter part of that year, most of them optimistically increased their packing and freezing capacity, and three more plan opened. Total capacity of the ten plants on 1 December 1965 was 160,000 pounds of fully processed shrimp per day. Three plants entered 1966 with daily production capacities of 50 to 70 thousand pounds each, and at least two others were in the 20 to 25 thousand-pound class.

48. Meanwhile, one of the largest plants (FRIOVEN) closed its doors. It was inconveniently located, and reportedly was poorly managed, and couldn't make a go of it even while shrimp were abundant. Its failure left more than adequate plant capacity under any circumstances. However, at about this time the resource failed to produce in its usual way (as described below, Paragraph 59), and once more the marginal plants began to close.

49. The three plants that were visited by the reporting officer (Lacustre de Pesca and Congeladora de Venezuela in the suburb of San Francisco, and FIAVESA in the suburb of Puntica de Piedra) are modern, well planned and well managed. They are typical of those that have survived the various crises. As the majority of the shrimp are delivered heads-on, the first step after unloading the truck is heading, which is done by hand labor. Some plants give the heads to a reduction plant; others dump them into the nearby channel or lake. If the headers fall behind, surplus shrimp can be held overnight in cold storage. As noted above, all the lake shrimp and most of those from the Florida-style trawlers arrive at the plants in excellent condition. The condition of the shipments from Punto Fijo leaves much to be desired. However, as long as the processors will pay good money for bad shrimp, the quality is not likely to improve.

50. Sorting by size is the next step. All the plants have one or more sorting machines. When the lake shrimp are about of a size, the girls who do the beheading are able to grade them roughly, and the sorter is not used. The trawler catches from the gulf are predominately 21 to 25 to the pound (heads-off weight), with some as large as "under 10", and others as small as 45 to the pound. The pinks are a little smaller than the whites. The lake shrimp run about 41 to 45 (heads-off), with a few as large as 31-35, and a great many as small as 70 or even 100 to the pound.

51. The final steps are hand packing, freezing and storage. The great majority of the production goes into 5-pound cartons as heads-off, shell-on tails, graded by size groups. The broken tails and culls are peeled and packed as "pieces" or "meat", at reduced prices. The production of peeled and deveined, individually quick frozen shrimp is slowly increasing. Most of the shrimp used for this product are peeled and deveined by hand. Although one operator has a machine for deveining, he is not completely satisfied with it. The small white shrimp from the lake and the pinks from the gulf lend themselves admirably to the production of the peeled and deveined IQF, because of their size. Production of this product should increase because of the added price that is paid, especially in view of the recent drastic drop-off in catches (see below, Paragraph 59).

52. Shrimp from the gulf are usually packed as either whites or browns, with the three species of grooved shrimp (the brown, pink, and spotted pink) grouped together as "browns". Some plants pack the pinks separately. Generally the lake shrimp are packed as whites, even though varying proportions of immature pinks and browns and adult camaroncitos de río are included. All species taken in the lake vary considerably in color, depending on season and area, and sometimes the darker individuals are packed as browns, regardless of species.

53. One processor is now packing for the retail trade in cartons of 12 ounces, 1 1/2 pounds, and 3 pounds. The individual waxed cartons and the 50-pound kraft master containers are available locally. Processing and packing costs are reported to be about 20 per cent of the total cost.

54. De-heading, cleaning and packing are on a piecework basis. Each plant has 60 to 200 workers, mostly women, during the height of the season, plus 10 to 25 full-time men. Including both fishermen and plant workers, the shrimp industry provides employment for five to six thousand people.

55. Shipments are made to the United States by both air and sea. Most of the early shipments were by refrigerated steamer. In 1964 and early 1965, the two national air cargo lines took over most of the business by offering fast service to Miami. Linea Expresa Bolívar, S.A. (LEBCA) and Rutas Aéreas Nacionales, S.A. (RANSA) could deliver frozen shrimp in 4 to 6 1/2 hours with their Constellations,

C-47's and Stratocruisers, carrying 650 to 1,000 master cartons of 50 pounds net (55 to 62 gross, including glaze and containers). The cost of 4 cents per pound gross compared favorably with 3 cents net by steamer, especially as the quick trip resulted in faster payment for the product. The planes are non-refrigerated, but the temperature of the frozen shrimp increases only 3 to 5 degrees Fahrenheit en route.

56. Several steamship lines began to compete aggressively in 1965. They can offer greater cargo capacity and lower rates. Atlantic Lines and Grace Line, among others, provide regular service connecting Maracaibo, Punto Fijo and Puerto Cabello with various U.S. ports. By making adjustments in figuring gross weights, they can offer rates of 4 1/2 cents a net pound to New York. The trend back to sea transport will continue as an increasing proportion of the production is packed as I.Q.F., because with this product there can be no rise in temperature in the package, as in an airplane.

57. Venezuela has no export tax on shrimp. However, plant owners must pay import duties on equipment, machinery, etc., most of which comes from the United States.

58. Venezuela exercises territorial jurisdiction along its coasts and around its islands to a distance of 12 nautical miles measured from the low water mark. In as much as all known shrimp resources, except for those in the very middle of the Golfo de Venezuela, are well within 12 miles of shore, it is not likely that shrimp fleets based in foreign ports will ever enter the fishery. Furthermore, the Venezuelan fishing law (ratified in 1961) calls for maritime zones where the State shall exercise its authority to further the fisheries resources "whether they are being used by Venezuelans or aliens". Obviously, foreign fishermen would not be welcome in the middle of the gulf. If so, someone would have taken advantage of excellent sites for bases at the nearby Dutch islands of Aruba and Curacao.

59. The foregoing description of the Venezuelan shrimp industry brings us to September 1965, when the fishery was at its height. Each preceding month had brought record breaking catches and exports. Fishing fleets and packing facilities were being expanded at a rapid rate to take advantage of the seemingly inexhaustible resource. When catches dropped in September, no one worried. Fishing has always varied from month to month, and in the new fishery no consistent pattern of seasonality had yet developed.

60. Catches became progressively worse through December, but the unconcerned operators continued their expansion programs. Early 1966 showed no improvement. One bad month succeeded another, and the industry realized that it was experiencing a crisis. Marginal plants dropped out temporarily, ready to re-open when fishing

improved. Everyone lost money for a year, and not until October 1966 did fishing recover slightly to the break-even point.

61. The extent of the disaster can best be expressed in the following figures. During the first seven months of 1966, catches of shrimp in the Maracaibo area amounted to only 35 per cent of the comparable period in 1965, for a drop from 11,739,000 pounds to 4,106,000 pounds. During the first nine months of 1966, imports into the U.S. were only 18 per cent as much as during the period of January through September 1965. This reflected a decline from 11,998,000 pounds to 2,167,000 pounds.

62. Everyone had his own explanation for the failure, ranging from over-fishing to oil pollution. However, the experts believe that the poor fishing is due to some cyclic change in abundance, such as has occurred in other shrimp fisheries in the past. Most of the slump has been due to a scarcity of white shrimp, with the normal run not occurring. The lake has not been producing sub-adult whites as it should, which may affect future production. If nothing else, the failure highlights the dependence of the industry on one species. In other fisheries (Panamá, for instance), when one species is temporarily scarce, the fishery can take up most of the slack with one or another of several species.

63. Meanwhile, with Venezuelan production off and the demand on the U.S. market at an all-time high, prices are up to unprecedented levels, and other countries with good catches have been profiting at Venezuela's expense.

64. The Venezuelan fishery faces the future with understandable apprehension, but considerable optimism. It must carry on with two threats in being and one, or possibly two, hanging over its head. The two existing problems are the possibility of violently fluctuating catches, as illustrated by the failure of 1966, and the problem of poor quality. Future problems involve a plan to modify the entrance to the lake to prevent the intrusion of sea water, and the ever-present possibility of depletion due to over-fishing.

65. Nothing much can be done about the problem of fluctuating catches, except to learn enough about the resource and its requirements that predictions can be made which will help the industry adjust in advance.

66. A great deal can be done about the quality problem. Local observers are convinced that the serious setback to the export industry, which occurred in 1962-63, was due largely to the shipment of sub-standard products. Although actual catches continued to rise in 1963, exports fell off considerably (See Paragraphs 5 and 6). Some of the inexperienced packers, through inept and careless procedures, further degraded the shrimp which had arrived at the plant in poor condition. The results were widespread rejections by the health authorities in

the United States, and a poor reputation for Venezuelan shrimp.

67. The packers who survived this early setback realized the necessity for producing high quality shrimp in order to reinstate their product in the export market. Their plants are well laid out and well operated. The products that they pack from the catches of the Florida-style trawlers and the canoe fishermen are the equals of any on the market. However, their best efforts can not make a good product out of most of the catches made by the Punto Fijo fleet, which arrive at the plant with heads on and with little or no refrigeration. Their efforts recall the old saying that you cannot make a silk purse out of a sow's ear.

68. The solution itself is simple, but it requires changing the lifelong habits of the fishermen. It has been proved conclusively that: a.) shrimp start to decompose as soon as they are removed from the water; b.) decomposition commences in the intestines and other internal organs, and proceeds rapidly to the tail meat (the process of de-heading actually removes both the head and the carapace, which contains the internal organs), and c.) the higher the temperature of the surrounding medium, and the dirtier the container is, the faster the shrimp deteriorates. The fishermen could either de-head the shrimp aboard the vessel immediately upon capture, or they could abandon the use of filthy boxes and change to refrigeration of the hold by chilled brine or ice bins. To take both steps would be better, and would bring the fleet into line with every other trawl fleet in the Western Hemisphere. The transport trucks should also be refrigerated, as they are everywhere else.

69. The vast petroleum industry has become concerned over the intrusion of sea water into Lago de Maracaibo, which is caused by the deep-water channel that was dredged for the passage of super tankers. The salt water causes damage of many millions of dollars to oil installations by corrosion, barnacles and shipworms. It is felt necessary to build some sort of control structure. The fishing industry fears that the exclusion of salt water will be detrimental to the nursery grounds. It is necessary to assess all proposals and insure building the type that will cause the least damage.

70. Depletion through over-fishing is always a possibility in a resource which is fished intensively with a variety of gear throughout all of its range and during its entire lifetime. Present legal restrictions resulted from a fight between entrenched fishermen and newcomers with more efficient gear. Should the fear of depletion prove real, the regulations must be evaluated.

E. OTHER COUNTRIES 1/

1. As noted in Section III-A, the shrimp fisheries of the Caribbean Area are concentrated in a few localities, particularly off Honduras, Nicaragua, and a small part of the Venezuelan coast (See sub-sections B, C and D). Trawlers based in U.S. and Mexican ports fish off the Caribbean coast of México, and U.S. vessels fish offshore from Honduras and Nicaragua. Otherwise, the shrimp fisheries are sporadic and are largely small-scale operations for local markets. The primary reason for the lack of fishing is that there are no great quantities of shrimp to be caught, largely because the combination of favorable nursery areas, feeding grounds, and a sea bottom suitable for trawling, is missing. Throughout the entire Caribbean, with the exception of Honduras, Nicaragua and Venezuela, the spiny lobster fishery is far more important than shrimp fishing. Some of the mainland countries (and this also includes Nicaragua), and nearly all of the islands, have flourishing lobster fisheries based on export to the United States and Europe.

2. The waters around the Bahamas support a small-scale shrimp fishery, mostly to supply the local market and the tourist hotels. Occasionally, small quantities are shipped to the United States. Official import figures are as follows:

U.S. IMPORTS OF SHRIMP FROM THE BAHAMAS

Year	1,000 Pounds	Year	1,000 Pounds
1954	-	1960	79
1955	30	1961	4
1956	-	1962	3
1957	7	1963	16
1958	4	1964	69
1959	-	1965	-

3. Cuba was one of the first countries to develop a shrimp fishery based on exports to the United States. The industry commenced in 1953, reached its peak in 1957,

---

1/ The following countries were visited during the course of the survey, some more than once (the date given is for the last visit): Jamaica, Barbados, and Trinidad and Tobago, June 1965; the Caribbean Coast of Mexico, June 1966; British Honduras, November 1965; Guatemala, January 1966; Costa Rica, May 1965; Panamá, May 1966; Colombia, April 1966.

and ceased abruptly in 1960 when the United States suspended all trade. U.S. import figures are as follows:

U.S. IMPORTS OF SHRIMP FROM CUBA

Year	1,000 Pounds	Year	1,000 Pounds
1953	124	1957	608
1954	113	1958	391
1955	71	1959	228
1956	222	1960	79

4. Since 1960, the Cuban fishing fleet has increased greatly. However, fishing effort is concentrated on taking fin fish for the domestic market and for shipment to the U.S.S.R., and spiny lobsters for export to Europe. As a result the shrimp fishery has languished.

5. Jamaica has a small-scale fishery for shrimp to supply the domestic market. Most of the shrimp are taken incidentally to the capture of fin fish, but they find a ready sale. Small quantities are exported to the United States from time to time, along with shipments of lobster. Recorded U.S. imports of shrimp from Jamaica are: 48 thousand pounds in 1959, 47 thousand pounds in 1962, and 10 thousand pounds in 1963. Normally, Jamaica imports frozen shrimp from the United States to supplement its own small catches.

6. Haiti and the Dominican Republic have only small-scale local fisheries for the domestic market. However, Haiti manages to export some shrimp, as indicated by U.S. import figures of 1,000 pounds in 1964 and 8,000 pounds in 1965.

7. Puerto Rico has a small-scale shrimp fishery that can not supply the local demand. Hence, considerable quantities of frozen shrimp are imported.

8. Throughout the Lesser Antilles there are numerous small shrimp fisheries, but none of any importance. These are mostly to supply local markets, but occasionally some shrimp are exported. U.S. import statistics show receipts as follows:

U.S. IMPORTS OF SHRIMP FROM THE ISLANDS OF THE EASTERN CARIBBEAN

(In 1,000 Pounds)

Year	Netherlands Antilles	Leeward and Windward Is.
1953	3	-
1954	-	-
1955	-	-
1956	6	-
1957	19	-
1958	-	-
1959	46	13
1960	-	-
1961	-	-
1962	5	-
1963	23	-
1964	-	5
1965	-	-

9. Although Barbados has only a very small local catch of shrimp, the island is the base for a high seas shrimp fleet that fishes off the Atlantic Coast of South America. The so-called "Guiana Fishery" is described in Section IV.

10. Trinidad and Tobago is the site of both local and high seas shrimp fisheries, but because most of the fishing is done in waters outside of the Caribbean Sea, these fisheries are described in Section IV, below.

11. The maze of keys and islands lying off the coast of British Honduras is the site of a very important spiny lobster fishery. Although the area appears suitable for shrimp, considerable exploratory fishing has failed to locate any substantial resources. Small quantities are taken off the southern coast, near the border with Guatemala. From time to time, small amounts are shipped to the United States, as indicated in the following table.

U.S. IMPORTS OF SHRIMP FROM BRITISH HONDURAS

Year	1,000 Pounds	Year	1,000 Pounds
1952	1	1959	41
1953	2	1960	1
1954	2	1961	1
1955	-	1962	30
1956	-	1963	7
1957	-	1964	5
1958	4	1965	-

12. An American who owns a lobster plant in northern British Honduras and a shrimp plant in the Republic of Honduras is building another lobster plant in the southern part of British Honduras. In November 1966 he informed the reporting officer that he is convinced that sufficient shrimp can be caught near his new plant to support a profitable operation. He intends to conduct experimental shrimp trawling.

13. Shrimp are not very abundant along Guatemala's short coastline on the Caribbean. This area now supports only a small fishery for the domestic market, although it was briefly the site of a small export fishery. Along the 50-mile coastline, shrimp are found only in the western portion of Bahía de Amatique, very close to British Honduras. Practically the entire catch is the white shrimp, Penaeus schmitti, which probably has its nursery area in nearby Lago de Izabal. In the bay, the occurrence of shrimp is said to be sporadic.

14. From about 1958 to about 1963, a small trawl fishery operated out of Puerto Barrios. The three to five boats made one-day trips to Bahía de Amatique. The catches were trucked daily to a freezing plant in Guatemala City. No separate statistics are available for the production of Guatemala's two coasts. However, U.S. imports from Guatemala during the first two years of the Caribbean fishery, and before the Pacific Coast industry commenced, were inconsequential. In 1958 they amounted to 39,000 pounds, and in 1959 they were 182,000 pounds. By 1963 the fishery had dwindled away to nothing.

15. The Caribbean Coast of Costa Rica is noted for its valuable, if erratic, spiny lobster fishery. However, there is no shrimp fishing. The environment appears to be satisfactory for shrimp, but little or no exploration has ever been conducted. Nicaraguan trawlers that have fished their coast almost as far south as the Costa Rican border report shrimp in some abundance. The area near the border with Panamá also appears to hold some promise.

16. No shrimp fishing has been carried on along the Caribbean Coast of Panamá. Exploratory work has not disclosed enough shrimp to interest anyone. Furthermore, the continually stormy weather has been enough to discourage any operations. The Panamanian shrimpers are content to fish in the storm-free waters of the Pacific, where a constant supply of shrimp is assured. It is suspected by some that additional exploratory fishing among the bays and islands around Bocas del Toro, near the Costa Rican border, would disclose the existence of a commercially fishable resource.

17. Colombia's long coastline on the Caribbean supports only local fisheries to supply the domestic market. Considerable exploratory fishing has failed to reveal substantial resources offshore, and suitable trawling areas seem to be limited and scattered.

18. The principal local fisheries are in the Ciénega Grande de Santa Marta and in the lagoons near the mouth of the Magdalena River. The former is an extensive marshy area lying between Santa Marta and Baranquilla. It is a nursery area for the spotted pink shrimp, Penaeus brasiliensis, and supports the larger of the two fisheries. The Río Magdalena is a nursery area for the white shrimp, P. schmitti. The fisheries, which are based on immature shrimp, are located at the outlets to the sea. Large fixed trap nets are set to fish on both incoming and outgoing tides. The shrimp are marketed locally as heavily salted cooked whole shrimp. Some are cooked and peeled. In 1956 the catch was estimated at somewhere between 600,000 and 1,000,000 pounds annually.

19. Further exploration may yet lead to the discovery of fishable resources somewhere along the 630-mile coastline. Shrimp in good quantities certainly occur in the Colombian part of the outer Golfo de Venezuela. At the opposite end of the coast, in the area southwest of Punta San Bernardo, fairly good catches of brown shrimp were made during the 1964 and 1965 exploratory fishing cruises of the U.S. research vessel OREGON.

20. The manager of the American operated freezing plant at Buenaventura on the Pacific Coast reported in April 1966 that his organization had conducted experimental fishing on the Caribbean Coast. It was satisfied that a substantial resource exists, and was preparing to establish a freezing plant and bring in some trawlers.

IV. THE SHRIMP FISHERY OF THE ATLANTIC COAST OF NORTHEASTERN SOUTH AMERICA

A. GENERAL

1. The waters off the northeastern coast of South America have been called "the greatest shrimping grounds in the Western Hemisphere." The description is not exaggerated. Virtually unknown ten years ago, and first exploited on a large scale in 1959, they supplied the United States market with over fifteen million pounds of shrimp in 1965. And the growing fishery has not yet approached its full potential.

2. The development of the exciting new fishery in hitherto unknown waters was due to three factors. First was well-planned Governmental research based on sound experience. The shrimp grounds were located by exploratory fishing vessels operated by several Governments in cooperation. Next was the equally well-planned follow-up by the fishing industry, as it established bases and built up high seas fleets to harvest the new-found resources. Perhaps of equal importance was the welcome given to the new industry by the Governments in the five countries where bases were developed. The thrust of the exploration and development has come from the United States, where most of the production is sold.

3. The story of the early days of the fishery has been well told in the magazine FISH BOAT for March 1964, in a series of reports entitled "U.S. Know-how is Building Greatest Shrimp Fishery in the Western Hemisphere---- 75,000 Square Miles Because the fishing area is a single entity, in spite of its vast size, and even though it is fished from bases in five countries, its history, scope and general operating procedures will be discussed as a unit in the following paragraphs. The specific details of the new export industry and the traditional local fisheries of the various countries will be discussed separately in the succeeding sub-sections. Much of the historical material was drawn from the above-mentioned report.

4. The area under discussion lies off the coast of South America between the mouth of the Orinoco River and the mouth of the Amazon River. Shrimp bases have been established in the following countries (in approximate chronological order): Surinam, Guyana, French Guiana, Barbados, and Trinidad and Tobago. Fleets from all these places mingle on the fishing grounds.

5. The story had its beginning as far back as 1944, when the United States and th

British West Indies first made a joint survey. Richard Whiteleather and Herbert Brown in their report predicted that the Guiana shrimp grounds would some day be big producers. The Governments of both French Guiana and Surinam commenced exploratory work in 1953. The French used the ORSON II, and their work that was concluded in 1956 confirmed the presence of commercial quantities of shrimp. The Dutch, using the trawler COQUETTE, continued through 1957, and definitely established the presence of good shrimp resources.

6. The clincher was furnished by the results of cruises made by the U.S. vessel OREGON in 1957 and 1958. Catches were spectacular to say the least. Furthermore, the results were published, the articles were read, and shortly thereafter American boat owners began to capitalize on the exploratory surveys by establishing bases and catching shrimp. Harvey Bullis, who was in charge of the OREGON cruises, is considered by the Guiana shrimp industry to be its prophet.

7. Although the offshore beds of large shrimp had remained undiscovered, the vast quantities of inshore sea bobs had long been the subject of substantial local fisheries. These had attracted some attention in the U.S., and in 1956 the first freezing plant in the area was established to produce sea bobs. Although the sea bob venture never amounted to a great deal, the plant was ready for action when the offshore shrimp fishery developed. This plant, located in Surinam, was the first in production. Its owner, Edwin S. Schweig, can take credit as being the original pioneer.

8. The explorations of the Government vessels disclosed several shrimp grounds of considerable promise and of rather great extent, but it remained for the commercial trawling fleets, with their daily, year-around fishing, to delineate their total extent. They proved to be bigger and more productive than anyone had dared hope. No substantial resources have yet been found off the coast of Venezuela, and all fishing is carried on to the eastward of the border between Venezuela and Guyana.

9. The fishing grounds had been developed by mid-1965 to encompass the areas described below. In general, fishing is carried on from 50 to over 100 miles from shore, in depths from 15 to 34 fathoms. The sea bottom is characterized by a gently sloping shelf from shore out to 32 to 34 fathoms. At this depth it shelves off abruptly. This drop-off is about 50 miles from the coast off Guyana, and trends farther offshore until off the mouth of the Amazon it is over 100 miles from land. The best catches are made along the drop-off, and nearly all fishing is concentrated at that depth.

10. The fishermen have given names to each of the five fairly well-defined

fishing areas, as follows:

a. The West Grounds lie off the coast of Guyana. These were the first to be exploited and are still popular.

b. The Middle Grounds are off the coast of Surinam (54° W. to 56°.30' W.)

c. The East Grounds are off the coast of French Guiana, west of Cayenne (52° 30' W. to 54° W.)

d. The grounds known as the Rock are near two small islands offshore from Cayenne, between 52° W. and 52° 15' W. This is a favorite area for the boats to transfer their catches to home-bound vessels.

e. The Gullies is the Amazon area, extending eastward from Cabo Orange (which is the westermost point on the Brazilian coast) to 47° 30' W. At Cabo Orange there is some fishing as close to shore as 30 miles, but the drop-off veers away from land to over 100 miles at the eastern part of the fishing area. The usual limit of fishing is at 48° W., 1° N. The bottom is featured by many mud hills and gullies, where the best fishing is encountered.

11. All of the fishing grounds are characterized by the prevalence of heavy seas, and particularly by strong currents. The currents flow to the westward, and as most fishing is done to the east of the respective home ports, the vessels buck into the current outbound (and are hard put to exceed six knots) but can ride the current home when laden. The heavy seas and currents made life difficult for the first boats to fish, which were typical Florida-style 62-to 65- footers. Many of them didn't last long, and neither did their crews. Replacement with 72- to 75- footers, heavily powered, proved more than satisfactory, and the whole complexion of the fleet changed. With the big vessels it is possible to fish every day of the year.

12.The most abundant shrimp, and the basis of the fishery, is the spotted pink shrimp, Penaeus brasiliensis. Also occurring is the similar northern pink shrimp P. duorarum. Because it is not distinguished by the fishermen (and often not by the scientists), it is not possible to say what proportion of the catch it constitutes. The brown shrimp, P. aztecus, is caught in some quantities. The white shrimp, P. schmitti, occurs in shallow waters. The boats seldom fish in

the shallows, for shrimp are scarce and the grounds are infested with trash fish. Throughout this section, the word shrimp without any qualifying adjective refers to the spotted pink shrimp.

13. The sea bob, Xiphopeneus kroyeri, is extremely abundant, particularly around river mouths. It is the subject of local fisheries, but for the present its importance is as a reserve resource of enormous size, if and when it becomes profitable to fish for it. Two very small species, Palaemon schmitti and Hippolysmata oplothoroides, are also important in the local fisheries, particularly in Guyana. The OREGON discovered fairly good quantities of various species of deep-water shrimps, but these are not expected to form the basis for a fishery as they are scattered and inaccessible.

14. The several enterprises that have been established in the various countries to harvest the shrimp of the Guiana-Amazon grounds all follow the same general operating pattern. Each consists essentially of a fleet of far-ranging trawlers, a shore base which includes a freezing plant, shops, parts depot, etc., and a distribution system for the finished product in the United States. They all require in reasonable proximity to the fishing grounds: a source of good labor and vessel crews, boatyard facilities, an ice making plant, fuel supplies and groceries, hospitals, electric power, living quarters for supervisory personnel and boat captains, air service for flying personnel in and out as replacements or on rotation, shipping facilities for the frozen shrimp, and above all, governmental permission to operate under terms that will permit them to make a profit and at the same time provide a boost to the local economy. By utilizing existing physical facilities or building new ones, and by training plant workers and fishermen themselves, with good shipping service by refrigerated ship, with the whole-hearted cooperation of the Governments, and by overcoming the various problems that arose initially, the operators have been able to build remarkably successful new industries in Surinam, Guyana, French Guiana, Barbados and Trinidad and Tobago. Lacking some of the requisite conditions in Brazil, no shrimp industry has yet developed in that country.

15. The first operations were established in those countries that are closest to the fishing grounds. Plants were built in Paramaribo, Surinam; Georgetown, British Guiana (which later became the independent nation of Guyana); and Cayenne and St. Laurent, French Guiana. Following these original installations came those in Barbados and at Port of Spain in Trinidad. In 1966 an 84-foot steel freezer trawler based in Puerto Rico began to fish the South American grounds. These sites were chosen, even though at a considerable distance from the fishing grounds, because they offered certain amenities in living conditions for boat captains and supervisory personnel, and could provide excellent logistical support.

16. In most cases, the basic component is the producer, who is generally a fleet operator with a home base in Florida or Texas, with his own sales and distribution system. Several fleet owners merge their groups of vessels into a sort of super-fleet, and build a freezing plant to be operated jointly. The shrimp are packed with the labels of the several producers or with a joint marketing label, or some of each. Independent fleets can arrange to have their catches packed with their own labels or can sell outright to the plant.

17. The basic production unit is a fleet of 12 trawlers, with its manager. The super-fleets of most plants are in multiples of 12 (sometimes as few as 10 or as many as 14, but 12 is the handiest number to manage). At all but one plant, the fleets are completely standardized to facilitate maintenance and repairs. The boats carry identical engines (almost always the standard Caterpillar), auxiliaries, electronic equipment, etc. At first the boats were ordinary Florida-style trawlers, but these proved too small to cope with the heavy seas and currents, as noted above. Fleet by fleet, these were replaced by larger and more powerful vessels. There has lately been a distinct trend from wooden construction to steel, and many of the latest vessels are equipped with their own freezing systems. However, most of the vessels are brine-refrigerated; there are no ice boats. In total, the fleet is the most modern and best equipped shrimp fleet in the world. All of the vessels operate under the U.S. flag, except for one Japanese fleet at Paramaribo and British units at Georgetown and Port of Spain.

18. Operating practices vary from fleet to fleet, but most units (of 12 boats) follow the "buddy system". They fish as units, and when one boat returns to port he carries with him the catches of his companion boats, which remain on the fishing grounds until their turn comes to put into port. The fleets that are based at a distance have elaborate transfer systems. Almost all captains are Americans, mostly from Florida and Texas. Most of the crewmen are local fishermen, some of whom have become qualified to take over as captains. The one exception is the Japanese fleet which is manned by Japanese. Most fleets have alternate captains for regular relief and home leave.

19. The three key classes of personnel necessary for a successful operation are plant manager, fleet manager, and vessel captain. The plant and fleet managers must be resident personnel, on hand at all times to insure smooth operations. In almost all cases they are owners or part owners. Many of the companies are family enterprises, and the various members of the family take their turns managing at the overseas bases and at the home plants in the United States. Finding and keeping a total of over 200 boat captains has been a real problem for the industry, even with offers of high pay and home leave. If the skipper doesn't like his

working or living conditions, he can always get another job back home. Meanwhile, he is beset on all sides by temptations, living in a strange country and working at a lucrative job. Many have gone bad, in which case the procedure is uniform: one-way passage home on the first plane. But replacement is difficult and expensive. The operators have found that there is no substitute for good Americans as skippers, but they can't always get them.

20. The problem of unauthorized transfers of catches at sea, and sale or barter by the skippers, is serious in the Guiana fishery, as elsewhere. In self defense, a group of responsible operators has banded together to prevent this practice, by hiring undercover agents and offering rewards.

21. The Guiana-Amazon fishery is described in the following sub-sections, country by country. The industry is still expanding rapidly. Existing plants are being enlarged and improved, and new ones are being built. The growing fleet is in a constant state of flux, with new and bigger boats being added constantly and old ones returning to the U.S. Sometimes old and new units overlap briefly. At any one given moment, no one can tell accurately the exact size of the operating fleet. Taken in the context of constant change and improvement, the following descriptions are glimpses of a dynamic industry as it was at the moment.

B. BARBADOS 1/

1. Barbados is the easternmost island of the West Indies. Its port city of Bridgetown is located at approximately 59° 38' W., 13° 5' N., which makes it the closest port in the Antilles to the Guiana-Amazon shrimp grounds. Barbados is the newest and smallest nation in the Western Hemisphere, having become an independent member of the British Commonwealth in November 1966.

2. The history of the shrimp industry commenced in May 1963, with the first exports being made two months later. The American operators were attracted to Barbados by the presence of a new seafood freezing plant, exceptional harbor and shipyard facilities, adequacy of supplies, excellent sea and air transportation,

---

1/ The field survey of the shrimp industry in Barbados was made in June 1965, and that date is implied in references to current activities, unless otherwise noted.

a fine all-year climate, outstanding living conditions, good labor, and a stable government that was anxious to attract a new industry.

3. Although the distance to the fishing grounds is great, the advantages outweighed this one difficulty, and the operation has flourished from the outset. Because Barbados is offshore, the boats can approach the grounds on an angle and avoid bucking into the westerly current for at least part of their trip. It requires approximately 50 hours to reach the West Grounds, and 150 hours to the Gullies off the Amazon. By taking advantage of the currents part of the way, the return trip is a little quicker.

4. The Barbados Seafood Co. was formed by a group from Fernandina Beach, Florida, and Aransas Pass, Texas. The home base is in Fernandina Beach. The original members, whose fleets still dominate the operation, are Y.E. Hall, John C. Fergus and Sydney E. Herndon. As of June 1965, the fleet consisted of 24 trawlers. By April 1966 it had increased to 32. The vessels are all new, identical 72-foot wooden trawlers, powered with D-342 turbocharged Caterpillar engines, and equippe with brine refrigeration. The Barbados fleet was able to take advantage of the experience of the earlier fleets, and as a result it started from scratch with adequate vessels.

5. The boats work as a single fleet. The rotation system is precise: each boat on the grounds transfers its partial catches two or three times to its homebound "buddies", and then takes its turn in carrying home its own final catch and the partial loads of designated companion vessels. All captains are Americans, who have acquired residences in Barbados. The three-men crews are all composed of Barbadians or fishermen from nearby islands. These are notable seamen and fishe

6. The freezing plant is owned and operated by the Barbados Marketing Corporatio a Government statutory board. It was built originally to handle the catches of the local fishery, mostly flying fish. It was barely large enough for a big shr operation, with an original daily freezing capacity of 24,000 pounds. By improvisation, the capacity was enlarged somewhat to accommodate the growing fle The Government was rather reluctant to expand facilities in fear that the new operation might move elsewhere and leave them with a useless plant. However, in 1966 a signed agreement was reached. The Board is going ahead with a program th will treble the original capacity of the plant, increase storage capacity, make room for a peeling and deveining machine. There will also be a new shrimp dock and appropriate shore facilities for the fleet, which is expected to expand to i target size of 50 trawlers.

7. The frozen shrimp are sent to the United States by refrigerated cargo vessel.

Several lines offer excellent service. A steadily growing proportion of the pack is consumed in Barbados. The biggest buyers are the many resort hotels. There is no local shrimp fishery to supply the demand on the island.

8. Most of the exports go to the United States. Hence, the following table, which lists official U.S. import figures, gives a good idea of the rapid growth of the industry.

U.S. SHRIMP IMPORTS FROM BARBADOS

Year	Weight, 1,000 Pounds	Value, 1,000 Dollars
1963	245	173
1964	1,472	1,314
1965	1,830	N.A.

9. Most of the above figures are in heads-off, shell on weights, as that is the principal product. With the new plant facilities, a greater proportion of peeled and deveined shrimp will be produced. It is to be noted that the first shipments were made in July 1963, so the figures for that year represent only a half-year. Only nine boats were fishing initially, and a dozen by the end of the year. By early 1964, the fleet numbered 14. Shipments during the first nine months of 1966 were 1,410,000 pounds, practically the same as the 1,423,000 pounds in the comparable period of 1965.

10. With new processing and port facilities and a larger fleet, it is expected that the Barbados industry will continue to grow. The shrimp industry is a welcome addition to the economy of the small new nation, which has seen little industrial development. Heretofore, the economy had depended largely on sugar, trading and tourism.

C. TRINIDAD AND TOBAGO 1/

1. The islands of Trinidad and Tobago lie close to the shore of Venezuela, and are generally considered to be geographically part of South America. Together they comprise an independent nation which is a member of the British Commonwealth. The capital city, Port of Spain on the island of Trinidad, is a busy commercial port and has recently become a shrimp center.

2. In 1960, a shore base for Japanese tuna vessels was built at Port of Spain. It was a fully equipped freezing and cold storage plant. Because the tuna plant was built at the very time of the first Guiana shrimp boom, some thought was given to freezing shrimp. A small operation actually got underway, but it soon failed. It is said that the fleet was too small and the individual vessels were too small to make the long run to the Guiana coast.

3. Although the Gulf of Paria, which separates Trinidad from Venezuela, has all the appearance of a good shrimp area, it has never produced any quantities. Occasional scouting has been unsuccessful. With no local source of shrimp and no high seas fleet, Trinidad remained out of the large scale shrimp industry for another five years.

4. A combination of circumstances brought about a revival of interest in mid-1965. For one thing the Japanese tuna vessels began encountering poor fishing and the cold storage plant did not have enough business to keep busy. This caused the owners to actively seek partners with shrimp boats. About the same time, one of the operations in French Guiana had internal problems, and one of its fleets began looking for another home port. Meanwhile, the operation in Barbados had proved that a modern fleet of large vessels could operate successfully from a distant port. The result was a new shrimp base.

5. The tuna plant of International Foods, Ltd., was partially midified in June 1965 with the installation of sorters, blast freezers, and other equipment. The company is locally owned by the Lee Lum enterprises. Two U.S. fleets moved in, beginning in July 1965, and the first exports were shipped the following September.

1/ The field survey of the shrimp fishery of Trinidad and Tobago was made in June 1965, a few months before the export industry commenced. Some of the material in this section was obtained from the operators before they started, and the up-to-date information resulted from an interview with the Senior Fisheries Officer in November 1966.

By November 1966, the Tampa Shrimp Co. had 28 trawlers delivering to International, and Rex Fisheries Corp. had 12 vessels. All are under the U.S. flag.

6. The two U.S. fishing companies catch and deliver the shrimp, provide the cartons, arrange for the shipment by refrigerated steamer, and handle their own sales. International Food provides the packing, freezing and cold storage services, at a reported 10 cents per pound.

7. Another new producing fleet is also using the facilities of International Food. This is International Fisheries, Ltd., which has three new 75-foot Texas-built freezer trawlers. These vessels, which fish the distant banks off the Amazon, fly the flag of Trinidad and Tobago. The company is owned two-thirds by local investors, including Lee Lum, and one-third by the Texaco Company.

8. A second freezing plant is entirely British owned. Union International, Ltd., took over a banana plant and converted it with all new shrimp freezing equipment. This company has a fleet of 12 Texas-built trawlers, all under the U.K. flag, and has 12 more on order for delivery in 1967.

9. Two independent fleets sell to either freezing plant. One of these fleets consists of 4 trawlers; the other of 2, with 4 more on order. All are former U.S. vessels, of wooden construction.

10. International Food has purchased an additional fleet of 12 trawlers in the U.S., 3 of which had arrived as of November 1966. This fleet, whose permit is still pending, is financed by Chinese-American money, and will reportedly have a Formosan fleet captain and perhaps vessel captains. (Although the Japanese tuna fleet has left Trinidad, 18 Formosa Chinese tuna vessels still use the base.)

11. All the large sizes of shrimp are exported to the United States. The medium sizes are shipped to Canada. The small cocktail sizes (50 to 60 to the pound, heads off) are exported to the United Kingdom, shipped to the West Indies, or consumed locally.

12. Most of the fishing is off the Guianas and Brazil. However, some of the smaller boats fish off the north coast of Trinidad for brown shrimp and royal reds. Only the boats with the flag of Trinidad and Tobago may fish inside territorial limits.

13. A rather large local fishery is carried on from the dozens of fishing villages along the West Coast of Trinidad facing the Gulf of Paria. Reportedly, 1,200 small trawlers of less than 40 feet take shrimp close to shore. As much as 50 tons

of whites and browns are landed per month. These are all consumed by the domestic market. The numerous Chinese restaurants are the biggest buyers.

14. The United States import statistics show that the short-lived early industry shipped 194,000 pounds in 1960, and 15,000 pounds the following year. The new fishery shipped 180,000 pounds during the last four months of 1965. The fast-growing industry sent 984,000 pounds to the U.S. during the first nine months of 1966.

15. Port of Spain has all the facilities necessary for a shrimp industry. It possesses an excellent harbor, shipyards, inexpensive fuel oil locally produced and refined, supplies and engine parts, good labor and good fishermen, alert and progressive businessmen, refrigerated freighter service to all the world with frequent schedules, all the amenities for foreign personnel, and a stable Government that welcomes new industry.

16. The vigorous new fishery appears destined to continue growing apace. The fleet sprang from nothing to 60 vessels in a year, with at least 18 additional boats planned for 1967. The Guiana grounds are within a reasonable distance. Furthermore, if planned exploratory fishing to the north of Trinidad, around Tobago, and particularly in the Gulf of Paria and off the Atlantic Coast of Venezuela, disclose hitherto undiscovered resources (as many believe it will), Port of Spain will be able to develop a short range fishery to supplement the distant water grounds. With its close trade ties with Canada, the United Kingdom and other Commonwealth countries, Trinidad and Tobago can develop additional markets outside the United States. Many of these countries prefer the smaller sized shrimp, which apparently are abundant in nearby waters as well as off the Guianas.

D. GUYANA 1/

1. The Atlantic Coast shrimp industry has achieved its greatest development in Guyana. The country, which became an independent member of the British Commonwealth in May 1966, was the colony of British Guiana when the shrimp fishery

---

1/ The field survey of the Guyanese shrimp fishery was made in July 1965, and this date is implied in all references to current activities, unless otherwise noted.

had its inception in January 1959 with a pioneering fleet of 10 boats. The old nickname of British Guiana - B.G. - hangs on, and is perpetuated in the brand name of Bee Gee Shrimp, one of the country's leading exports.

2. Within months after the publication of the OREGON cruise results, U.S. shrimp industry leaders were in the capital and principal port city of Georgetown, making arrangements for what quickly became the largest shrimp fishery south of Venezuela. The Versaggi and Sahlman families of Tampa, the Fazio family of St. Augustine, and the Walker family of Pensacola, brought their fleets to Georgetown, and can be said to be the true pioneers of the fabulous fishery that soon attracted many others.

3. The four fleets, operated separately, fish collectively for the one packing house that was founded by the owners. The fleets, each with its own office and managed by members of the respective families, are the Versaggi Shrimp Co., Sahlman Seafoods, John Fazio Shrimp Co., and the Walpace Company. The freezing plant is organized in Guyana as the Georgetown Seafoods and Trading Co., Ltd. All production is marketed through B.G. Shrimp Sales Co. of Tampa.

4. As of July 1965, the fleets fishing for Georgetown Seafood numbered 75 trawlers, the largest production unit fishing for any one plant in South America. The vessels are modern, and mostly standardized. All captains are Americans and all boats are under the U.S. flag. The three-man crews are all Guyanese, who are excellent fishermen. The vessels fish all the areas from the West Grounds to the Gullies, anywhere from 9 to 80 hours from port.

5. Initially, Georgetown Seafoods occupied an old building on the Demerara River waterfront in downtown Georgetown. Ice and various other services were provided by local suppliers. The plant proved to be inadequate, and often surplus catches had to be sent to the neighboring plant of Guyana Merchants, Ltd., which had not yet entered the shrimp business on its own (see paragraph 7). A new plant was built in 1965, and the old building and dock became the fleet offices and supply base, net lockers, storage, repair shop and moorings.

6. The new Georgetown Seafoods plant is at Providence, about ten miles up the Demerara River from Georgetown. The trawlers can unload directly at the company dock and can take on ice from the new ice plant. Refrigerated steamers pick up the frozen shrimp at the company dock for direct shipment to the U.S. The plant itself is the largest anywhere south of Mexico with a daily packing and freezing capacity of over 75,000 pounds. Two sorting machines are in use. The plant is spacious enough for the future planned installation of a peeling and deveining machine, and the land is adequate for further expansion. The plant manager is a British resident of Guyana.

7. The Guyanese owned Bookers Enterprises operates a freezing plant under the name of Guyana Merchants Limited. This plant, in an old building but with modern equipment, is located on the Georgetown waterfront. The plant, which is entirely Guyanese operated, has a daily capacity of 30,000 pounds. Nearly all its exports go to the U.S.

8. Guyana Merchants had its own fleet of 6 trawlers in July 1965, and planned on obtaining more. All were built in the U.S. but fly the U.K. flag. All captains and crewmen are Guyanese, many of whom received their training aboard U.S. boats. Guyana Merchants also handles the production of two U.S. fleets, which between them own 18 trawlers: Thompson Enterprises, Inc., and Thompson and O'Neill. Other fleets are expected to join them.

9. Georgetown has all the requisites of a shrimp port; frequent refrigerated ship sailings, port facilities, fuel oil and supplies, air service for personnel and emergency shipment of parts, adequate labor, excellent fishermen, and housing for supervisory personnel and boat captains. There is only one boatyard capable of handling shrimp trawlers. Although it is excellent, it can not adequately handle the hundred vessels now based in Georgetown. Consequently the U.S. company is planning its own boatyard. The Government has given every encouragement to the new industry and has welcomed what has become one of the country's largest employers and earners of foreign exchange.

10. The growth and magnitude of the Guyana shrimp industry is indicated by the following table, which gives U.S. import statistics. The weights shown are mostly heads-off, shells-on, with some peeled and deveined. The small shipments in 1955 and 1956 were probably dried shrimp.

U.S. SHRIMP IMPORTS FROM

GUYANA (formerly BRITISH GUIANA)

Year	Weight, 1,000 Pounds	Value, 1,000 Dollars
1955	1	-
1956	2	1
1957	-	-
1958	-	-
1959	967	621
1960	3,568	2,328
1961	3,506	2,305
1962	4,129	3,582
1963	5,509	4,668
1964	5,502	4,020
1965	7,973	N.A.

11. The Government exempts all fishing supplies and equipment from import duties. The freezing plants pay income and property taxes. The export tax is 3 per cent ad valorem. The annual vessel license was $1.10 in 1965, but was to be raised to $27.50.

12. In addition to the export fishery, Guyana has a local shrimp fishery which has been in existence for many years. The fishery is conducted in the rivers, principally the Essiquibo and Courantyne, by means of Chinese trap nets. The tiny shrimp are known locally as "white bellies" or "fine shrimp". They are dried for local consumption and export. The dried and peeled meats average about a thousand to the pound. The estimated annual catch in 1956 was approximately 800,000 pounds, heads-on weight. The tiny river shrimp are extremely abundant, and sea bobs are plentiful in the eastern part of the country. It has been estimated that small shrimps could support a fishery of 4 or 5 million pounds a year, if a market were available, which is not likely.

13. Having grown rapidly, the Guyana shrimp industry has probably already approached its maximum development. Only the addition of more boats and plants will cause production to rise much more. Additional fishing effort will probably result in smaller catches per boat, a result that was noted on the West Grounds after only two or three years of fishing before the boats spread out to the eastward. Moderate increases can still be expected. During the first nine months of 1966, U.S. imports from Guyana ran somewhat ahead of 1965: 6,576,000 pounds, compared to 5,902,000.

14. In 1966, a long established Guyanese firm planned to open a new freezing plant in the eastern part of the country, on the Berbice River near New Amsterdam, and was reportedly recruiting U.S. shrimp boats. If it materializes, it will be the only plant between Georgetown and Paramaribo, and it could result in increased total production for the country.

E. SURINAM 1/

1. Surinam is a semi-autonomous part of the Kingdom of the Netherlands. It was formerly known as Dutch Guiana. The capital city of Paramaribo, located on the Surinam River, is the site of the first shrimp freezing plant in the Guianas.

1/ The field survey of the shrimp fishery in Surinam was made in July 1965. This date is implied in all references to current activities, unless otherwise noted.

2. The shrimp industry of Surinam developed in a different manner than those in the neighboring countries, and has continued along different lines. Surinam has had an important fishery for sea bobs for many years. These are taken in the river mouths by a canoe fishery, using Chinese shrimp traps and pin seines. The small sea bobs are boiled, sun-dried and peeled. The cooked, peeled meats average more than a hundred to the pound. In 1956, the annual catch of sea bobs, known locally as sara-sara, was estimated to be in excess of a million pounds, heads-on weight. It was further estimated that the sea bob resource could produce 5 to 6 million pounds a year if trawling was introduced along the coast.

3. The abundant sea bobs attracted some attention, and in 1956 Edwin S. Schweig of New York built a plant to pack and freeze them. It must be remembered that this was shortly before the tremendous offshore resource of pink shrimp had been discovered. The Surinam Government was anxious to see the development of new industry and welcomed the Schweig operation. In fact, the company was given a 15-year exclusive concession for the export of shrimp, which is the only such permit in the entire area. It expires in 1970. The operation had to depend on the whims of the canoe fishermen, operating a long distance away, with uncertain transportation and supplies of ice. Hence, it was marginal and barely survived until the time that the pink shrimp were found. The plant was then in a position to move ahead, although it was several years before it became a large-scale industry.

4. The original plant has been modernized and rates with the best anywhere. Located on the Paramaribo riverfront, with its own dock for trawlers, it is a fully equipped, self-contained enterprise. It is known as Surinam American Industries, Ltd., or SAIL for short. (The corporate name in Dutch is Surinaamse-Amerikaanse Industrie Maatschappij N.V.) The sales agent is World Wide Marketers, Ltd., of New York.

5. The plant is spacious and has ample room for expansion. The two blast freezers have a combined daily freezing capacity of 55,000 pounds. The plant has grading machines and a peeling-deveining machine. An ice making plant, machine shops, parts depot, warehouses, cold storage plant, offices, and restaurant complete the lay-out. Although most of the pack is the usual heads-off, shell-on, in 5-pound cartons with a heavy glaze added after freezing, the peeled and deveined I.Q.F. pack is of increasing importance. The peeling machine is used for this product, followed by hand cleaning to insure top quality. The smaller sizes (45 to the pound and smaller) are marketed locally.

6. Vessel operations are different than anywhere else in the area. Two entirely separate fleets fish for SAIL. One consists of U.S. vessels, whose catches are

exported to the U.S. The other fleet is Japanese, and its catches are shipped direct to Japan.

7. The U.S. fleet consisted of 15 vessels in July 1965. Of these, 6 are company boats (owned by World Wide Marketers). The remainder are individually owned and their operations are not as tightly controlled as those of the company vessels. The independents buy their ice, fuel, supplies, parts, etc. from SAIL. There has been considerable turnover among the independent vessels and captains, but the continual trend has been toward bigger and better boats. The U.S. fleet is not standardized. The vessels were built in several yards, are of both wood and steel, of various sizes, and with varying equipment. Most have Caterpillar engines, but some have G.M.'s. Most of the captains are Americans, but some are Guyanese. The crewmen are mostly Surinamers, with a few Guyanese.

8. The Japanese vessels operate as a unit, with a Japanese fleet manager. They are owned by Nippon Reizo, the big freezing and cold storage company in Tokyo. Three of the 10 Japanese-flag trawlers were built in Japan. Seven, all of which are powered by Caterpillars, were built in the U.S. Most are of steel construction. All skippers are Japanese. Most of the crewmen are also Japanese, with some Surinamers. All Japanese personnel receive four to five months of home leave after two years. The fleet manager stated that the fishermen prefer the vessels that were built in Japan.

9. The shrimp caught by the Japanese fleet are handled by SAIL under a special arrangement. For a flat fee (rumored to be 12 to 15 cents a pound), the plant unloads, grades, packs, freezes, holds in cold storage, and ships. All exports go to Japan. They are shipped under the SAIL concession. All fishing equipment for the Japanese fleet is imported from Japan; engines and parts come from the U.S.

10. Although no precise breakdown is available, it is estimated that the U.S. and Japanese fleets each catch about half of the total production. The Japanese fishermen were reportedly slow to catch on at first, but learned fast. In 1964, the top five boats were Japanese, and their performance was comparable in 1965. The Japanese fish mostly on the Middle and East Grounds, whereas the American vessels make most of their catches off the Amazon.

11. The following table lists shrimp imports into the U.S. from Surinam. Figures for the years 1955 through 1958 are mostly for the early operation on sea bobs, and at least part of the shipments through 1961 were also sea bobs. Beginning with 1964, the U.S. imports represent only part of the output of the Surinam fishery. As noted above, about 50 per cent of the production is exported to Japan and does not show in the table.

U.S. IMPORTS OF SHRIMP FROM SURINAM

Year	Weight, 1,000 Pounds	Value, 1,000 Dollars
1955	3	1
1956	37	28
1957	65	64
1958	81	47
1959	289	228
1960	381	290
1961	447	278
1962	1,036	969
1963	1,205	1,154
1964	1,323	1,049
1965	1,409	N.A.

12. Paramaribo has many attractive features as a shrimp center. The city is located on a navigable river, with frequent sailings of refrigerated cargo ships. The shipyard facilities are excellent, and fuel and supplies are readily obtainable. Labor is good, and fishermen are available. Living conditions for foreign personnel are good. And the port is close to the best fishing grounds.

13. The Surinam Government was anxious to attract industry and offered various inducements to the freezing plant besides the exclusive concession on exports. These are exemptions from the import duties on vessels, machinery, parts, and equipment. There are no export taxes or other fees on frozen shrimp.

14. The present operation should continue to expand moderately. Several other operators are interested, and reportedly will enter the industry when the present exclusive permit expires in 1970. The tremendous resource of sea bobs awaits exploitation. When it becomes feasible to catch and pack them profitably, the growth of the industry will be tremendous. The resource should be able to produce several million pounds of peeled sea bob meats annually for the American and European markets.

F. FRENCH GUIANA 1/

1. Although it is the smallest and least populous of the three Guianas, French Guiana has the distinction of having two shrimp ports. French Guiana was formerly a colony, but is now a Department of the Republic of France. It has very little industry, and the Government welcomed the shrimp enterprises. The two major plants are important employers of labor, and frozen shrimp is now the leading export item.

2. The two shrimp freezing plants commenced operations in 1963. They are located at opposite ends of the coastline. One is at St. Laurent near the mouth of the Moroni River, which separates Surinam from French Guiana. The other is on the outskirts of Cayenne, the capital city, near the mouth of the Cayenne River. In both cases, the operators had to build completely self-contained installations that virtually amount to small towns, as the country was able to supply little in the way of support facilities.

3. The plant at St. Laurent du-Moroni was built by John R. Mann, Y.C. Fernandez and associates, all of Tampa. Until some time after Mr. Mann's death it was known as Mann Shrimp of St. Laurent, Inc. It is now called St. Laurent Shrimp Co. of Tampa. The plant is on the riverbank and the trawlers can unload at the company's own dock. The installation is modern in every respect. The blast freezer has a daily capacity of 25,000 pounds. Two grading machines, in tandem, are used. Being in a remote town of only a few more than 2,000 inhabitants, practically no logistical support existed, and everything had to be built from scratch: dock, plant buildings, a marine ways, an apartment house for vessel captains and their families, and homes for supervisory personnel. Although St. Laurent has no scheduled airline service, it can be reached from Paramaribo and Cayenne by charter plane, bus and automobile.

4. The location is handy to the fishing area, being midway between the Middle and East Grounds. St. Laurent is 20 miles from the sea, and the river water is fresh, not brackish. Hence, the boats are kept free of barnacles, marine borers, etc., and need less frequent haul-outs than in most places. Refrigerated steamers call regularly to pick up the frozen shrimp.

1/ The field survey of the French Guiana fishery was made in July 1965, and representatives of the producing companies were interviewed in November 1966.

5. Production is entirely heads-off, shell-on. The shrimp run large, with 45 per cent in the 10 to 15 to the pound range, and 80 per cent larger than 25 to the pound.

6. By early 1965, the St. Laurent fleet had grown to about 30 trawlers. Of these, 10 were Mexican-flag vessels with Mexican captains and crews. The others were U.S. vessels. In mid-1965 the company underwent internal difficulties. In June, the Mexican boats were sold and departed for Fortaleza, Brazil, to enter the lobster fishery. Reportedly this fleet had not been too successful, as the West Coast vessels were too small and somewhat underpowered. In July, one of the U.S. fleets departed for its new base in Trinidad. This left St. Laurent with no more than 12 trawlers, and production declined.

7. In 1966, the company was reorganized and embarked on a program of procuring a brand new fleet of large modern vessels. By November, 28 were in operation with 20 more on order.

8. The other, and larger, plant is at Le Larivot on the Cayenne River, 3 miles and 7 road miles from Cayenne. This plant is Pecheries Internationales de Guyane Francaise, which is known to all by its nickname PIDEG. The operation is a joint venture. The 80 per cent U.S. participation is provided by Henderson Portion Pak, Inc., which since the plant was built has become an affiliate of Bordens Food. The other 20 per cent is local French capital. The plant is under the management of the three Magnan brothers, two of whom are long time residents of French Guiana.

9. With the plant located outside of town, it was necessary to build a complete self-contained installation. Work started in 1962, and the plant packed its first shrimp in January 1963. The packing plant and ice plant are on the riverbank adjacent to the company wharf. The boats can discharge shrimp and load fuel, provisions and ice simultaneously. The shrimp are flumed directly to the plant, being washed en route, as at the plants in Providence, Guyana, and Paramaribo. Two grading machines are used, in tandem. The plant capacity for the standard heads-off, shells-on pack is 35,000 pounds a day. Most of the larger sizes are packed in this manner, in the usual five-pound cartons.

10. Of increasing importance is the peeled and veined pack. As of mid-1965, the plant was producing up to 2,000 pounds a day of individually quick frozen (I.Q.F.) and 5,000 pounds of butterfly (with tail attached). All the peeling and deveining is done by hand; however, it was planned to install a machine to perform this operation. The favorite size for these packs is in the range of 31 to 40 to the pound. The I.Q.F.'s are packed in 3-pound plastic bags after freezing individually on metal sheets. The butterflies are packed in 5-pound boxes for

direct shipment to the parent company's breading plant in Miami.

11. PIDEG also puts up small quantities of specialty packs for the European market. For these, sea bobs are used. The trawlers that are fishing close to home are sometimes asked to bring in sea bobs from the last day or two of fishing, with heads on. Occasionally some heads-on large shrimp are ordered, also. These are boiled with spices and red coloring, packed in 3-pound boxes and frozen. France is the principal market. The sea bobs run about 70 to the pound (heads-off equivalent). When the peeler-deveiner is in operation, the I.Q.F. pack will be increased greatly. Also the machine will be used on sea bobs to produce cooked meats for the European trade.

12. Of necessity, the PIDEG installation consists of more than a packing plant and a wharf. An entire village was literally hacked out of the jungle. The net locker and parts depot are impressive (two full-time net men are employed). The machine shop for vessel maintenance is located on the dock. The restaurant and commissary are adjacent to the dormitory for unmarried captains. Married captains and supervisory personnel live in company houses and duplexes. Top executives have attractive individual homes. Plant workers are brought from town by bus.

13. Both PIDEG and St. Laurent have found the local workers capable and skillful. Even the Carib Indians, who were hitherto deemed to be unemployable, have turned out to be excellent grounds keepers. PIDEG solved the shortage of local office workers and accountants by bringing in a French speaking Canadian couple. The two freezing plants have added immensely to the total payroll of the country, and the economic impact has been considerable.

14. Ocean steamers call regularly at a dock adjacent to PIDEG. Fuel supplies are also close at hand. A Government owned marine ways is next to the plant. The trawlers can use the boatyard at reasonable rates, with PIDEG employes doing the repair work. Vessels can enter only at high tide (there is a 13-foot tide). As facilities are somewhat minimal, the company has acquired land and will build its own repair yard.

15. The fleet that fishes for PIDEG is constantly undergoing expansion, and older boats are being replaced by new and much larger vessels. In July 1965, the combined fleets consisted of 28 trawlers. Of these the company's Red and White Fleet (so-called because of the color scheme) included 22 boats under three affiliated ownerships. At that time, seven additional vessels were en route. The 6-vessel fleet of Hankin and Newton delivers shrimp for processing under the owners' own label. Occasionally, boats from the other ports, when having engine

trouble, land their catches at PIDEG for processing for the owners. The fleet was scheduled to number 39 trawlers in 1966, with 10 additional on order for 1967. All additional vessels and replacements are the latest model, oversize, heavily powered steel vessels, especially designed for offshore fishing. In late 1966 two of these broke records for big catches: 21,000 pounds and 24,000 pounds for 28-day trips.

16. All vessels are under the U.S. flag, with American captains. Fleet managers and the overall fleet supervisor are also Americans. Crewmen are from all three of the Guianas, but are mostly local men. The company has two stand-by skippers, so that all captains can take home leave in rotation. The boats usually make 18-day trips, fishing around the clock, and remain in port three days. The new larger boats make longer trips.

17. The vessels from both St. Laurent and Cayenne fish all the grounds. They jointly pioneered the Gullies off the Amazon in May 1964. Shrimp are found there the year around, but the weather off the Amazon is bad from January through March. During this time of year the boats tend to fish on the West Grounds where the weather is better. As of mid-1965 it was estimated that the Rock and Gullies grounds produced 60 per cent of the Cayenne catches.

18. Unlike the fisheries in the neighboring countries, which experienced a "breaking in" period that lasted for several months or years, with exports increasing over a long term, the French Guiana industry started in full stride. Both companies had to build complete installations from scratch, but as soon as the plants were finished they went into nearly full production. This resulted in many early problems, which seem to have been resolved. St. Laurent's production slumped badly during its reorganization, but PIDEG continued to expand. Total imports into the United States are shown in the following table.

U.S. IMPORTS OF SHRIMP FROM FRENCH GUIANA

Year	Weight, 1,000 Pounds	Value, 1,000 Dollars
1963	2,789	1,952
1964	2,961	1,956
1965	3,961	N.A.

19. The local fishery for sea bobs is concentrated in the lower reaches of the

Cayenne River. The canoe fishery uses Chinese seines or traps. Realizing that the sea bobs would have a market in France, the Government sponsored a cooperative association which built a small but beautifully equipped freezing plant in 1962. The plant is operated by Societé d' Interet Collectif de Maréyage, or SICOM for short. The sea bobs are delivered daily, or more often, by the canoes. They are boiled for three minutes, with heads on, with assorted spices and bright red coloring. The sea bobs from the river are very small, 100 to 200 to the pound, heads-off equivalent. They are all packed for the French market. In 1964, about 50 tons were exported. SICOM also handles fin fish that are taken by hand-line boats which are based in Venezuela and Martinique. The boats fish off the Brazilian coast, and sometimes land their catches in Cayenne for freezing and shipment to Martinique and Guadeloupe.

20. The sea bob resource along the coast near the river mouths is apparently very great. PIDEG is convinced that if the demand in France is great enough, a large industry can be developed. It is thought that a 45-foot trawler, able to operate in the waist deep water on the flats off the mouth of the Cayenne River, could make heavy catches.

21. The Government, in order to encourage the new industry, made very attractive tax concessions on the basis that the packing plants and fleets would provide employment and in general be of benefit to the local economy. All equipment for the original plant could be brought in duty free. Replacement parts and equipment for enlarging the plant may be imported at 75 per cent of the usual duty. Vessels and all parts and supplies for the fleet may enter free of duty. There is no income tax for the first eight years of operation. There is no export tax on frozen shrimp. These inducements counteract in some measure the otherwise high costs of operating in a remote place with scanty support facilities.

22. The French Guiana fishery should continue to thrive. With both companies in nearly full production, served by growing modern fleets, production will increase somewhat. Exports to the United States were up considerably during the first nine months of 1966: 3,225,000 pounds, compared to 3,026,000 pounds in the comparable period of 1965. The potential resource of sea bobs is a reserve for possible future exploitation.

G. BRAZIL 1/

1. Shrimps are abundant along the entire coast of Brazil. A large fishery exists for the domestic market, but no large-scale export industry has developed.

2. In the previous regional report, Lindner, writing in 1956, stated that the annual Brazilian shrimp catch was estimated at 20 to 25 million pounds, live weight (see References, Section V). This tremendous production was entirely for domestic consumption. Three separate fisheries account for most of the production. The northern fishery, which contributes about half of the catch, is carried on east of the mouth of the Amazon to near Sao Luiz. Fishing is done by means of trap nets and seines, in the estuaries and along the beaches. About 60 per cent of the catch is sea bobs. The remainder consists of juvenile white and brown shrimps. The fin fish trawlers from Rio de Janeiro and Santos take large quantities of adult white, brown and spotted pink shrimps along the south-central coast, between Rio Doce and Laguna. The large southern fishery is near Rio Grande, and is based on the run of young spotted pink shrimp out of Lagoa dos Patos. This fishery is seasonal and variable from year to year. More than half of the total catch is sold partially dried and heavily salted.

3. The potential production of shrimp in Brazil if a modern trawl fishery is ever developed would be incalculable. Milton J. Lindner, the Hemisphere's foremost shrimp authority, in speaking at the 1957 meeting of the Gulf and Caribbean Fisheries Institute stated the possibilities as follows: " The Brazilian shrimp potential is estimated to be between 60 million and 100 million pounds annually, but it could go considerably beyond this." It must be remembered that this statement was made before the fabulous offshore pink shrimp grounds in the north had been discovered.

4. Nine years later, the latent potentiality of the shrimp resource was described in another way by W.E. Ripley, the International Director of the United Nations Brazilian Fisheries Development Program, who has an intimate knowledge of the fisheries. He told the reporting officer,"Brazil could produce more shrimp than all the rest of Latin America combined." In evaluating this statement it must be noted that in 1965, the United States imported 120, 166,000 pounds of shrimp from all of the countries of the Hemisphere except Brazil, whereas Brazil contributed only 474,000 pounds that year. It is interesting to speculate what the story will be nine years from now.

1/ Although Brazil was visited during the survey, in May 1966, no field survey was made in the shrimp fishing areas.

5. Actually, several attempts have been made to establish a modern export industry, but all efforts have been fruitless. Throughout the rest of the "shrimp world", the new industry has been greeted enthusiastically by local investors and businessmen. In one or two places Governmental reaction has been lukewarm, but almost everywhere the various Governments have welcomed the industry. Without local support no new fishery can develop, and so far the shrimp industry has detected no signs of encouragement in Brazil.

6. Meanwhile, a lobster fishery for export has developed along the north coast, with investment by French and U.S. interests. Shore plants have been built, and numerous vessels have been acquired. These include the 10 Mexican vessels that were purchased in French Guiana in June 1965, and 7 new vessels built in México and delivered to the owners in September 1966. All of these boats are capable of conversion to shrimp trawling. In fact, the original owner of the fleet from French Guiana maintained an interest in two of the vessels and kept his Mexican skippers aboard. They started to trawl for shrimp and made their first shipments of frozen shrimp to the United States in September 1966. Some American companies, realizing that some day the fishery will be permitted to develop, have established bases and are marking time by producing lobsters and fish fillets.

7. For several years, small quantities of shrimp have been exported to the U.S., as noted in the following table.

U.S. IMPORTS OF SHRIMP FROM BRAZIL

Year	Weight, 1,000 Pounds
1959	80
1960	43
1961	40
1962	57
1963	7
1964	35
1965	474

8. The 1965 figures indicate a small beginning for an export industry. The upward trend continued in 1966, with imports into the U.S. at 459 thousand pounds for the first nine months, compared to 365 thousand for the same period of 1965. Much of

the increase over previous years is probably due to the establishment of a modern freezing plant in Sao Sebastiao, near Santos. This combination fish and shrimp plant commenced shipments of frozen shrimp to New York in November 1965.

9. The newly established U.N. project for fisheries development will undoubtedly play an important part in helping formulate a policy toward the establishment of a large scale shrimp fishery. If and when an export industry is developed it could grow to be the largest fishery south of México, and Brazil could perhaps even surpass that country as the world's greatest supplier of U.S. imports. If so, the resulting foreign exchange would be a great asset to the country. On the other hand, the competition of a new fishery would provide a serious blow to the established industries in the other countries of Central and South America.

V. ACKNOWLEDGMENTS AND REFERENCES

1. It would not have been possible to prepare this report without the whole hearted help and cooperation of a great many people. Wherever the reporting officer went, he was greeted warmly and courteously by Governmental officials of all ranks, by fishermen and plant operators, and everyone else connected with the shrimp industry. All information that was requested was provided freely. The many pleasant experiences connected with the survey reaffirmed the reporting officer's belief that the fraternity of the fishermen knows no national boundaries.

2. Likewise, the help of all U.S. Embassies and Consulates throughout the area of the survey is gratefully acknowledged. The personnel at all posts helped the reporting officer in making contacts, in providing information both during and after the field survey, and in every way possible making the visits to their areas both successful and pleasant.

3. Numerous published and mimeographed reports were extremely useful in providing information. These are in various forms: U.S. Embassy reports, scientific and economic reports from Governmental agencies in several countries and from experts of the Food and Agriculture Organization, magazine articles, etc. The primary source document was the one and only comprehensive report on the subject, "Survey of Shrimp Fisheries of Central and South America" by Milton J. Lindner, which was published in 1957. For several areas there are complete definitive reports; these are noted in the following list of references by underlining the author's names.

4. A selected list of references to the shrimp fisheries of the survey area:

Avila, Quinto and Harold Loesch, Identificación de los camarones
1965 juveniles de los esteros del Ecuador. Inst. Nac. de Pesca del Ecuador, Bol. Cien. y Tec., 1 (3), 24 p.

Bullis, H.R., Jr. and J.R. Thompson, How's shrimping off the
1959.1 Guianas? The Fish Boat, July 1959, 4 p.

Bullis, H.R., Jr. and J.R. Thompson, Shrimp exploration by the M.V. Oregon along the northeast coast of South America. Comm. Fish. Rev. 21 (11), p. 1-9

Cervigón, Fernando, Exploratory fishing off the Orinoco Delta.
1965 Proc. Gulf and Caribbean Fisheries Inst., 17 th Session, p. 20-23

Departamento de Pesca de Panamá, Resumen de los desembarcos de
1965 camarones comerciales, Bol. Estadístico, 1, 13 p.

Eaton, Richard O., Jay V. Hall, Jr., and Clarence F. Wicker,
1964 (?) Port feasibility study, Pacific Coast of Guatemala, C.A., U.S. Army Corps of Engineers, 128 p.

Ellis, Robert W., La pesquería de camarones y los recursos
1965 camaroneros de El Salvador. Boletín de Pesca del Ministerio de Economía, 2, 59 p.

Ewald, Joseph Jay, The shrimp fishery in western Venezuela. Proc.
1965.1 Gulf and Caribbean Fisheries Inst., 17 th Session, p. 23-30

Ewald, Joseph Jay, Investigaciones sobre la biología del camarón
1965.2 comercial en el occidente de Venezuela. Instituto Venezolano de Investigaciones Científicas, Caracas, 147 p.

Iverson, E.S., Fishing for shrimp in Venezuela. Fishing News
1966 International, 5 (8)

Khandker, N. Alam, Some observations on the distribution of Penaeid
1965 shrimp in eastern Venezuela. Comm. Fish. Rev. 27 (7) p. 12-14

Landes Hugh C., Developing the Costa Rican fish industry. USFWS,
1965 Mkt News Leaflet 38, 14 p. (U.S.A.I.D. project)

Lindner, Milton J., Survey of shrimp fisheries of Central and
1957 South America. U.S.F.W.S., Special Scientific Report: No. 235, 165 p.

Loesch, Harold, The developing shrimp fishery of Honduras. Proc.
1961 Gulf and Caribbean Fisheries Inst., 14th Session, p. 171-178

Loesch, Harold, Informe al Gobierno de Guatemala sobre recursos
1963 de camarones. FAO/EPTA (No. 1721), 6 p.

Loesch, Harold and Avila Quinto, Claves para identificación de
1964 camarones peneidos de interés comercial en el Ecuador, Inst. Nac. de Pesca del Ecuador, Bol. Cien. y Tec., 1 (2), 29 p.

Lord, David B., U.S. know-how is building greatest shrimp fishery
1964 in the Western Hemisphere. The Fish Boat, 9 (3), p. 69-139

Perez Luengas, Alvaro, Recursos camaroneros del Pacífico Colombiano,
1964 Centro Piscicultura de Buenaventura, 58 p.

Pericchi López, Juan J., La industria del camarón en Venezuela,
1965 explotación y procesamiento del camarón. Corporación Venezolana de Fomento, Caracas, 81 p.

Pesquerías del Pacífico, Objetivos y funcionamiento de Pesquerías
1965 del Pacífico, S.A., Buenaventura, 16 p.

Rodríguez, Gilberto, Physical parameters of Maracaibo Estuary and
1965 their ecological implications. Proc. Gulf and Caribbean Fisheries Inst., 17th Session, p.42-50

Thompson, John, The fisheries industry of El Salvador, Journal of
1960 (?) Inter-American Studies, 10 p.

U.S. Embassy, Caracas, Venezuela's fisheries, 1964. U.S.F.W.S.,
1966.1 Foreign Fisheries Leaflet 32, 25 p.

U.S. Embassy, Caracas, Fisheries of Venezuela.
1966.2 Unpublished, 26 p.

U.S. Embassy, México, Information of the shrimp industry of
1959 Honduras. Unpublished, 3 p.

U.S. Embassy, México, Fisheries survey of shrimp fisheries in
1962 Guatemala, El Salvador and Nicaragua. U.S.F.W.S.,
Mkt.News Leaflet 74, 13 p.

U.S. Embassy, Panamá, Panamá's fishing industry, 1963. U.S.F.W.S.
1964 Mkt. News Leaflet 18, 11 p.

U.S. Embassy, Panamá, Panamá's fisheries, 1965. U.S.F.W.S.,
1966 Foreign Fisheries Leaflet 18, 9 p.

U.S. Embassy, Panamá, Developments in Panamá's fishing industry,
1962 1961. U.S.F.W.S., Mkt. News Leaflet 18, 10 p.

U.S. Embassy, San José, Shrimp and lobster fisheries of Costa Rica.
1961 U.S.F.W.S., Mkt. News Leaflet 61, 6 p.

U.S. Embassy, San Salvador, Shrimp industry 1964-El Salvador.
1965. Unpublished, 4 p.

Fig. 1.--Shrimp trawlers, docking facilities, and freezing plants (in background) at Guaymas, Mexico.

Fig. 2.--Shrimp fleet at Ciudad del Carmen, Mexico.

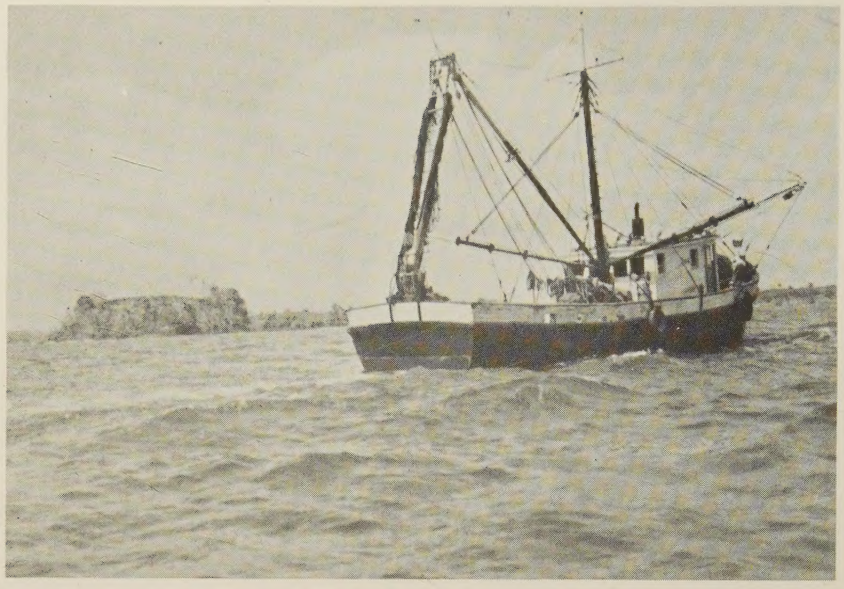

Fig. 3.--There is no substitute for local knowledge and experience in trawling for shrimp among the rocks and reefs off the Panama coast in the Gulf of Chiriqui near Pedregal.

Fig. 4.--One of the newer shrimp plants at Maracaibo, Venezuela, equipped for sorting, packaging, and freezing.

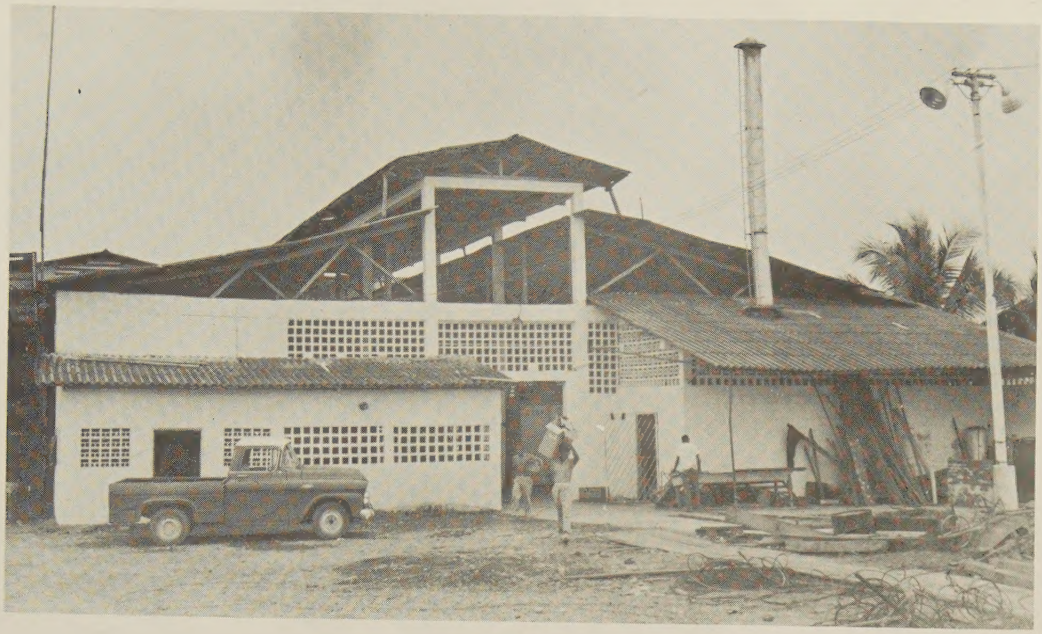

Fig. 5.--Shrimp freezing plant at Buenaventura, Colombia.

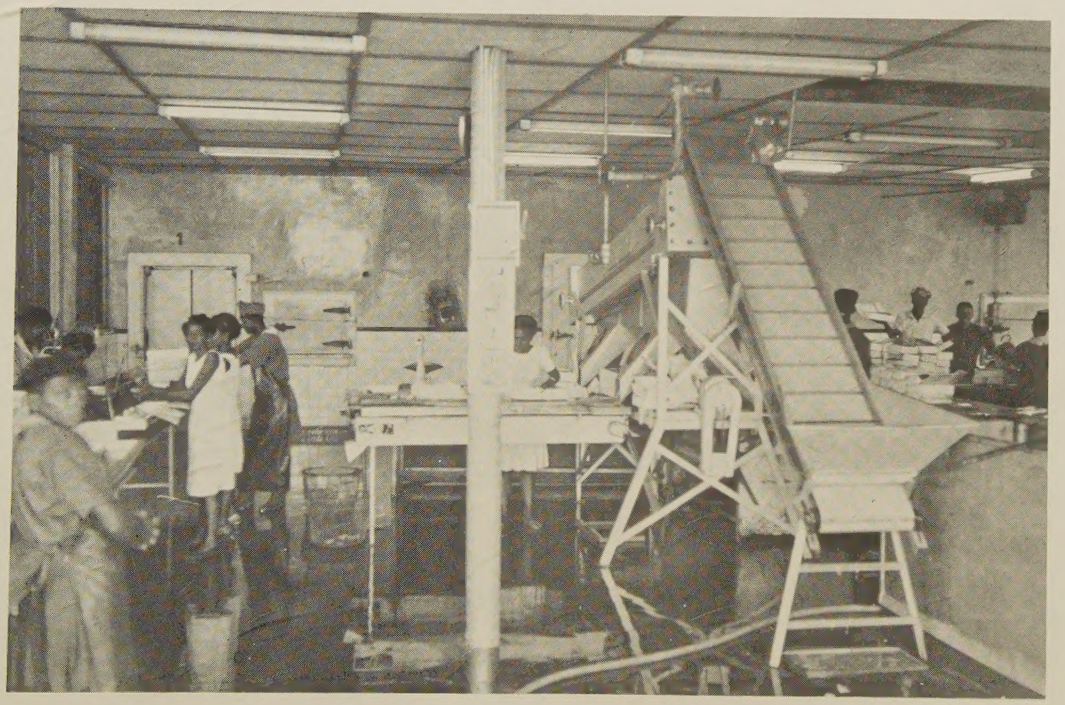

Fig. 6.--The inside of a shrimp plant at Buenaventura, Colombia. This plant has the only shrimp sorter in Colombia, but other plants "plan to order them."